American Aviation

FEBRUARY 27, 1956

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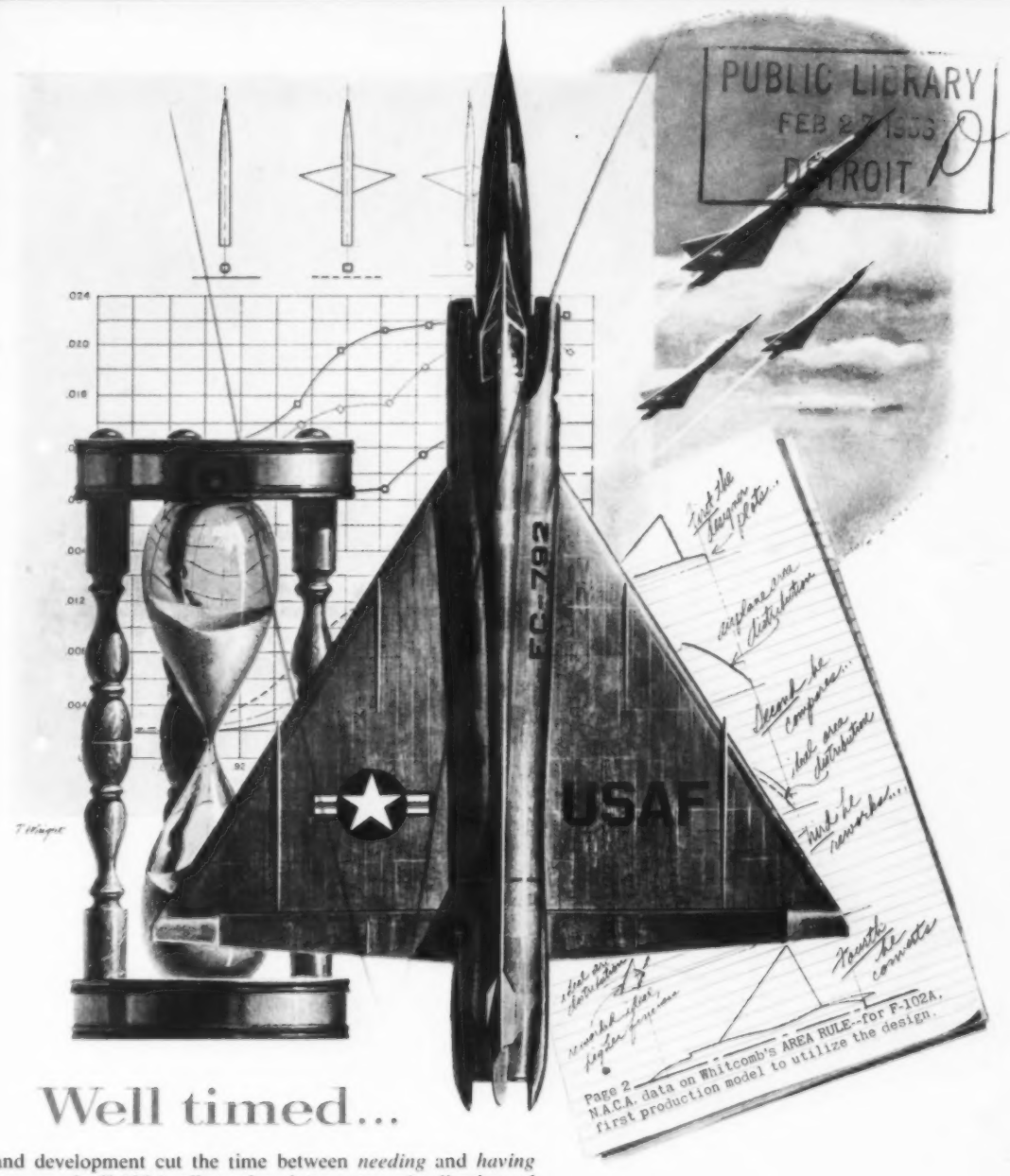

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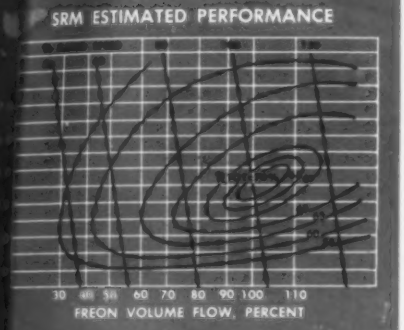
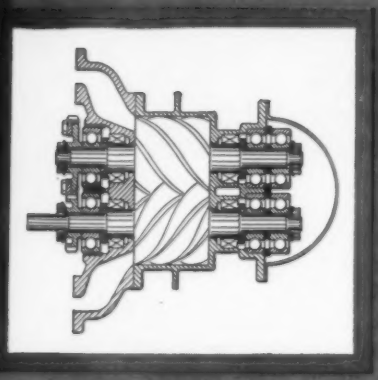
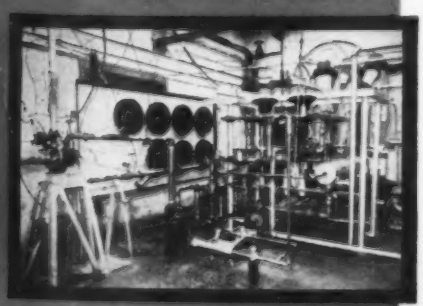


Performance Map Shows Compressor's Efficiency



Cutaway View Showing Compression Principle



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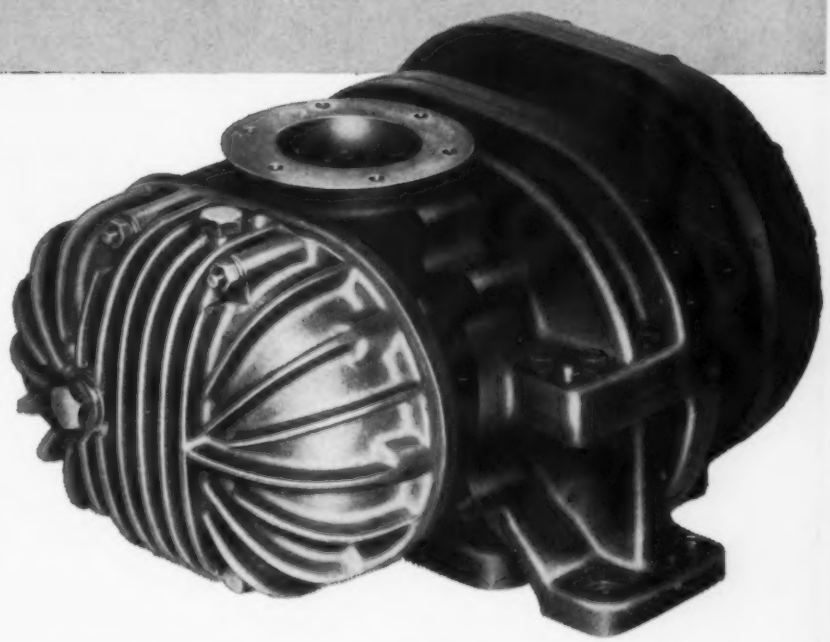

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OTHER PUBLICATIONS AND SERVICES

American Aviation Daily: Daily News service for the entire industry. $200 per year. Managing Editor—Keith Saunders.

American Aviation World-Wide Directory: Twice-yearly listing of products, people, and organizations. $7.50 each. Managing Editor—Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules, fares, World-Wide Edition: $19.50 per year, everywhere, North American Edition: $13.50 per year in USA; $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert R. Parrish.

Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Mary Miller.

Airports: Weekly newsletter for airport officials suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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Personal View

By WAYNE W. PARRISH

Beneath the Talk is a Budget Snarl

THE PRESENT extraordinary ruckus over ballistic missile development, the budget for USAF, and the relative military strength of the U.S. and the U.S.S.R., might be boiled down to these three items:

- Some people are talking too damn much.
- Some aren't talking enough.
- And some who are the best informed can't talk at all (security).

Far too much of the talk, especially in Congress and in newspaper columns, is misleading. It would lead one to believe that the U.S. is slipping badly. It implies that the Administration is selling the nation's welfare down an H-Bomb hole. It also gives the impression that only a few senators and columnists have access to the inside security information.

But beneath the loose talk is something very fundamentally wrong. A thorough airing is in order. The issue is not so much the status and progress of ballistic missiles, which even now are on a "crash" footing, but on the concept of the military budget as a whole.

Trevor Gardner did not resign as Assistant USAF Secretary for Research and Development because the ballistic missile program was suffering. He resigned because USAF has had to rob other vital projects of needed funds in order to give a maximum go-ahead for missiles.

What's at fault is the effort of the Administration to work out a stable Defense budget over a period of years. It says there is so much money to be spent this year and next year. Live within the budget. Over a period of years you will have everything you need.

It's a good fiscal idea—in theory. One might even say that it worked for one year several years ago. But defense requirements don't fit the theory. All of a sudden USAF found itself in a virtual emergency with urgent need to concentrate on the Intercontinental Ballistic Missile. Give USAF full credit; it wasted no time in giving ICBM full priority. But in doing so it had to put a lot of other things on the shelf. The stable budget concept simply doesn't fit the ever-changing requirements of national security.

In fact, ICBM is only one of several costly new projects which have sapped the long-range USAF budget conceived several years ago. Both DEW (Distant Early Warning) and SAGE (Semi-automatic ground environment) have absorbed a lot of money which USAF had earlier staked out for other projects.

As one top officer said the other day, what is needed is a *stable output* of new weapons systems rather than a *stable input* of dollars. In endeavoring to put its best fiscal foot forward in an election year the Administration has leveled off with a stable dollar input. The difficulty is that new weapons systems aren't developed that way. If priority is needed for such things as ICBM, other projects are bound to be dropped or postponed—and USAF is today lagging behind in a number of places.

Secretary of Defense Wilson now says he intends to appoint a missile "czar," which is probably a good thing in itself. In one sense this only tends to inflate the already inflated top civilian command in the Defense Department. While service rivalry probably isn't as great a factor in the present missile hassle as some have believed, there are enough weak spots and enough duplications to keep a full-time "czar" busy. It could be a worthwhile move.

Perhaps before it's all through, the current airing will bring about some healthy coordination. On the civilian side we're pleased that the White House took cognizance of the recommendation of the Aviation Facilities Study Group and named retired Maj. Gen. Edward P. Curtis to work out a program for new airports and new air traffic control facilities. We don't know General Curtis but the project which he heads is well laid out. Some similar coordination on such items as missiles and budget requirements for new weapons systems would likewise be in order.

Letters

Agrees with Editorial

To the Editor:

I sure agree with your analysis in the editorial "The Jet Age is Wonderful, But . . ." in the February 13 issue of AMERICAN AVIATION. Focusing national coordinated attention on this problem is certainly in order, since it is not only national but international in scope.

E. THOS. BURNARD
Executive Director
Airport Operators Council
Washington, D. C.

About MRA and MATS

To the Editor:

In the interst of preserving the accuracy for which your fine magazine is noted, herewith, a belated comment on your "Personal View" column, page 11, August 29, 1955, which took issue with the use of three Military C118 aircraft by the Moral Re-Armament group.

My comments are late because it took this long to determine the facts, which are these:

1. I work for a major airline, which was one of the many contacted by MRA in an effort to charter space for their Round-the-World tour last summer.

2. MRA paid the Military Air Transport Service $325 per hour flown for each of the three planes, plus $325 per day for standby time on each airplane. The total bill amounted to $124,930, for which MRA holds a receipt.

3. Had space been available on commercial schedules, the total cost for the same lift would have been approximately $99,993.60 tourist, or $125,260.80 first class.

I agree wholeheartedly with your censure of the carriage of non-military traffic on military aircraft. However, after the MRA group had exhausted every possibility of purchasing commercial space, and then paid MATS 99.7% of the first class commercial fare, I disagree with your statements . . . "MRA is paying but a fraction of the total cost" and "This gratuitous airlift" and "At the taxpayers' expense."

In the interest of fairness to MRA and MATS, and for the enlightenment of your taxpaying readers, I would appreciate your printing this letter in an early issue.

J. B. COOKE, JR.
San Carlos, California

Thanks . . .

To the Editor:

Thank you for your brilliant and forthright editorial in the January 16th issue which recognizes our great and good friend Ralph Damon.

In a peculiar and vivid manner which I cannot identify, you reflect the fervor which was so great a part of the man himself.

Thank you again for doing such an excellent job on this difficult and essential assignment.

A. W. LAIRD
Vice President
The New York Air Brake Co.
New York.

BOOKS

Aircraft Today. *2nd edition. Published by Philosophical Library, Inc., New York. Edited by John W. R. Taylor 96 pp., Price $4.75.*

This is the second edition of an annual publication aimed at those who do not read the trade press regularly. It contains a valuable article on "Shortening the Take-off" by James Hay Stevens, AMERICAN AVIATION's London Editor, as well as articles on other topical subjects such as "What Do We Known About Russian Aircraft?" "How Near is Push-Button Warfare?" and "The Future of Military Air Transport."

The book has an attractive make-up and is lavishly illustrated. Full color illustrations are used to accompany the article on "RAF Squadron Insignia." The only airline article in the book is devoted to Air France. . . . A. V.

Across the High Frontier. *By William R. Lundgren. Published by William Morrow & Co., Inc., New York. 288 pp. Price: $3.75.*

This is the fascinating story of Maj. Charles E. (Chuck) Yeager, first man to break the sound barrier, from his childhood in a small West Virginia town, through his distinguished career as a combat pilot during World War II, and including his outstanding achievements as an experimental test pilot. It is also the story of the development of the Bell X-1, first airplane to fly faster than the speed of sound. And finally it is an exceptionally readable account of the relationship of man and plane.—J. M.

Air Transport Management. *By R. Dixon Speas. Published by McGraw-Hill Book Co., New York 36, N. Y. 316 pp. Price: $8.50.*

This updated edition of Speas' earlier book on "Airline Management" stresses the technical aspects of air transport management, particularly operations, engineering, maintenance and economic factors of airline services. Added feature is a new 39-page section on turbine-powered transport aircraft.

Rotorcraft. *By R. N. Liptrot and J. D. Woods. Butterworth Scientific Publications, London. 170 pp. Price, $5.*

In a foreword, Igor Sikorsky introduces this book as "a thoughtful compilation of the available data, widely helpful at the time it is current, which becomes a valuable contribution to the history of the art in the future." The authors refer to it as an introduction to the theory and practice of rotary-wing aircraft without the complications of advanced theory and mathematics.

Both descriptions are modestly accurate, for the book is a veritable manual for anyone requiring *any* information about helicopters, technical or historical. It would be hard to fault the extensive tabular data—from the familiar Leonardo da Vinci sketch of 1483 through Louis Bréguet's first man-carrying helicopter of 1907, Sikorsky's 1908 and 1910 experiments, von Kárman's of 1916-'18, the Army Air Corps' first type, the de Bothezat of 1923, to an exhaustive list of 1954 helicopters.

Forty-three pages are devoted to specifications, drawings and photographs of most modern helicopters. . . . J.H.S.

Jane's All the World's Aircraft 1955-56. *Compiled and edited by Leonard Bridgman. Published by McGraw-Hill Book Co., Inc., New York. 409 pp. Price, $25.*

In its 46th annual edition, the mixture is very much as before and once again makes "Jane's" the world's most indispensable aviation reference book. Innovations are the inclusion of non-skeds in the table of airline operators and a chapter on "Guided Missiles" by D. A. Kimball, president of Aero-jet General.

The 409 editorial pages (there are 150 advertising pages) are 30 more than last year, contain 190 new airplane and 61 new power plant illustrations. The brief Soviet section is probably as complete as anything available West of the Iron Curtain—and more accurate and less speculative than most. . . . J.H.S.

200 Miles Up. *By J. Gordon Vaeth. Second Edition. The Ronald Press Co., New York. 258 pp. Price, $5.*

This second edition of a book first published in 1951 by the head of the New Weapons and Systems Division, U.S. Navy Special Devices Center, Office of Naval Research, tells the up-to-date story of the highest flights yet achieved or about to be achieved by man-made objects. As the preface says, "Its characters are rockets, balloons and artificial satellites. Its theme is the present and the future. Its setting is the upper limits of our atmosphere and beyond."

Three new chapters have been added. One, titled "The Minimum Satellite," explains why the artificial earth satellite holds great promise for science and mankind. Another, "Beyond the Earth," portrays the future evolution of flight beyond our planet in the light of present achievements. Opinions expressed are the author's and do not reflect the views of the ONR.

Industry News Digest

Plane Builders Tell Congress Their Profits are Reasonable

Aircraft manufacturers' profits on government contracts have been reasonable, and an adequate profit level is vital if production and research are to be increased, industry spokesmen have told a Congressional committee. Hearings on profits opened last week before the House Armed Services Investigations subcommittee headed by Rep. F. Edward Herbert (D., La.).

North American Aviation, Inc., Glenn L. Martin Co., and the Boeing Airplane Co. have taken this general position:

•With the Government as principal buyer, the "risks" resulting from unsteady demand make the cost of doing business greater.

•Use of Government facilities simply lowers the cost of the product to the Government.

•The profit "incentive" is the most important stimulus for manufacturers seeking to attract top management and technical talent, expand facilities, advance research and development programs, and reduce costs.

The companies have stressed their fine production records, the outstanding quality of their planes and their relatively low net earnings, as return on total sales. They disagree that return on net worth has any significance since production requirements outrun the industry's traditionally low investment, and because a single year's earnings actually reflect a long cycle of design, development and manufacture.

Among manufacturers, there is general agreement that present procurement procedures are as effective as possible. Fixed price incentive contracts, with their premium on cost-cutting, are particularly desirable, the builders indicate.

•**What they don't like,** however, is renegotiation. Or at least current renegotiation procedures, with their "unwise" reference to earnings as a return on net worth. Renegotiation that cuts their profits so far below comparable earnings in other industries, they fear, will slow the progress and dynamism of a vital industry.

House investigators, after three days of hearings into the "reasonableness" of aircraft manufacturers' profits, have indicated they are looking at the situation in these terms:

•The Government is the largest single customer, in some instances almost the only one, of the airplane builders.

•Most manufacturers are using substantial Government facilities in the design and manufacture of their aircraft, in some cases far exceeding their own investment.

•Sometimes, though, the companies' rate of earnings, dividends, salaries and bonuses, advertising and other overhead and administrative costs do not reflect an appropriate awareness of their role as Government contractors. The subcommittee insists it has an obligation to examine this role on behalf of taxpaying citizens.

But, adds Rep. Merbert, it's ultimately the Pentagon's responsibility to keep aircraft costs in hand.

"If plane makers' profits are unjustified, the Pentagon had better do something about it," he has declared. And Defense Department officials will be called before the subcommittee after industry representatives have testified, he promised.

Capital's Latest Viscount, the 700D

First Viscount 700D, Capital Airlines' tenth Viscount, will soon be delivered. It features more powerful (1,600-hp) Dart engines enabling cruising speed to be increased from 320 to 325 mph for lower fuel consumption. High-activity Rotol propellers are used to absorb the greater power. Marked noise reduction has been achieved by lower propeller tip speed. Greater power allows increases in maximum takeoff weight to 60,000 lbs. (62,000 lbs. with long-range fuel tanks) and in maximum landing weight to 54,000 lbs. (57,500 lbs. in the North American version).

President Names Curtis Assistant for Aviation

Edward Peck Curtis, vice president of Eastman Kodak, has been tapped by President Eisenhower to fill the critical post of Special Presidential Assistant to study and prepare a master plan for aviation facilities. The appointment, effective March 1, was made less than a month after it was officially revealed in the President's Budget Message that the Harding Committee recommendation to the Bureau of the Budget to proceed with such a study had been accepted.

Curtis

Curtis told AMERICAN AVIATION he is taking on the assignment with "no preconceived ideas." His responsibilities will encompass:

• Direction and coordination of a long-range study of aviation facilities requirements.

• Development of a comprehensive plan for meeting the needs set forth in the requirements study in the most effective and economical manner.

• Formation of legislative, organizational, administrative and budgetary recommendations to implement the plan.

Curtis estimates that he will have to devote himself to the study full-time for at least a year and will work with "a very small staff." He possibly will have an advisory board, but it will be run as "informally as possible." The Departments of Defense and Commerce have been instructed to cooperate fully.

Curtis joined Eastman Kodak in 1921 and was named vice president in 1945. He served as a combat pilot in World War I and in World War II rose to the rank of Major General, serving as executive assistant to General Carl Spaatz when he was chief of staff of the Strategic Air Force in Europe. He is currently in the inactive AF reserves.

Cessna Flies Production T-37 Trainer

First flight photo of Cessna Aircraft Co.'s production T-37 side-by-side Air Force twin-jet trainer (above) shows a pronounced redesign of earlier XT-37 tail, particularly in the addition of an under-fuselage stabilizer. Cessna last week received a $13-million-plus production order for T-37s, bringing its total trainer contract value to more than $26 million. T-37, powered by two Continental J69 jets, is in 400-mph class.

Gardner Wants $3.5 Billion Added To AF Budget, B-52 Output Tripled

Trevor Gardner called for tripled output of B-52 bombers—from the presently scheduled 17 a month to 45 a month. He said this and other increases requiring an additional $3.5 billion in fiscal 1957 Air Force appropriations are essential if the U.S. is to have the "first best" air force.

His appeal came on the heels of warnings from Soviet First Deputy Premier Anastas Mikoyan and Defense Minister Georgi Zhukov. Mikoyan said the USSR has atomic and hydrogen bombs "as well as the means to carry these bombs to any point of the earth by aircraft or rockets."

Declared Zhukov: "Soviet armed forces . . . now have diverse atomic and thermonuclear weapons, powerful rocket-propelled and jet-propelled armaments of various types, including long-range missiles."

• **Gardner,** former Assistant Secretary of the Air Force for Research and Development, asserted that Russia is ahead of the U.S. in development of offensive ballistic missiles and reiterated his demand for a crash program to speed perfection of the super-weapons.

"In that (ballistic) field I have felt the organization was confused and inadequate and we were not embarking on the necessary crash program to beat Russia," he told a panel of reporters on NBC's "Meet the Press."

Gardner proposed congressional action to create a new post in the Pentagon at the level of Deputy or Assistant Defense Secretary to take exclusive charge of missile development, including all necessary funds. (Defense Secretary Wilson's proposed "missile czar" would be a special assistant, without statutory recognition.)

• **Adequate funds** are now available for the Air Force ballistic program, but "unfortunately they come from manned aircraft," Gardner said. "My concern in this matter relates to the way it's organized," he declared. "Three services are competing to develop the ballistic missile . . . but only the Air Force is developing an intercontinental missile. One of our fears is that development of intermediate range missiles will slow down our own program."

Describing production of B-52 bombers as "pitifully small," Gardner said the production rate ought to be boosted to 45 a month. He said the Air Force needs a total of $20 billion for fiscal 1957 to do its job, and that the request proposed by the Administration "guarantees this nation the second best Air Force."

The former AF official said he had an opportunity to talk to President Eisenhower about the budget situation "under controlled conditions," but added: "I was prevented by a lack of time from making my views known."

• **Meantime,** Air Force Secretary Donald Quarles sought to defend the Administration ballistic program. In testimony before the House Military Appropriations Subcommittee, he made these points:

Manned aircraft, not missiles, will be decisive in air warfare for another five years, at least.

Soviet achievement of an intermediate range ballistic missile "would not materially affect the balance of power between the two blocs" and even the development of an intercontinental missile "of any accuracy . . . in the next decade will be only a marginal advantage to them over their bomber force and not a complete new and revolutionary thing."

IAM Strike Closes Four Republic Plants

Production lines at Republic's Farmingdale plant and three smaller Long Island facilities were shut down by a strike of the International Association of Machinists, which bargains for 12,000 workers. About 7,000 administrative and engineering employes were not involved in the walkout.

At issue was a wage increase. Under a wage-reopening clause in the three-year Republic-IAM contract, the machinists had demanded 41c an hour and later reduced the figure to 19c. Republic offered five cents an hour.

Republic applied to the New York State Supreme Court for an injunction to limit picketing as picket-line incidents mounted. The company announced the plants would stay open and production workers reporting would get the 5c increase.

B-52s to Get IBM's New Bombing 'BRANE'

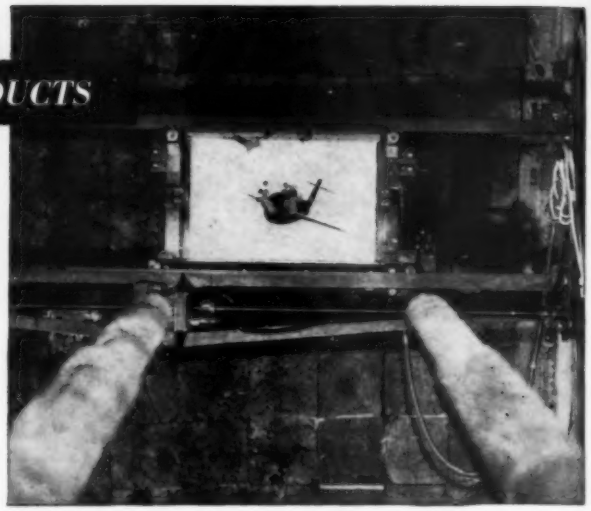
Air Force's eight-jet Boeing B-52 bombers are slated to get a new bombing and navigation system of "unprecedented reliability," Thomas J. Watson, Jr., president of International Business Machines Corp., disclosed.

IBM's "BRANE" (for bombing radar navigation equipment) uses newly-developed, long-lasting electronic and mechanical components to achieve extraordinary reliability in automatically guiding B-52s through a bombing run, Watson said.

Although operating details were withheld for security reasons, IBM officials said BRANE's flexibility also permits adaption to other advanced bombers. They added that research is continuing to keep the system abreast of rapid advances in supersonic warplane design, presumably referring to Convair's B-58 supersonic bomber development.

Lockheed F-104A Makes First Test Flight

Lockheed's F-104A, production model of the USAF's newest supersonic fighter, made its first flight at Edwards AFB on Feb. 17. Plane is powered by General Electric's new J79 engine which replaces the Wright J65 of the XF-104 prototype.



Problem: To cut armament system development time

Solution: New G-E DYNAT reduces need for flight test.

DYNAT—that's the name General Electric gives to its new Dynamic Accuracy Tester which can now evaluate complete airborne armament systems during ground firing under fully simulated flight conditions.

Combat readiness of airborne armament systems can be evaluated only by complete testing; so extensive flight tests are necessary to duplicate actual armament system environmental conditions. This procedure is expensive, time consuming and gives only a sampling of a system's performance. DYNAT solves this testing problem by simulating on the ground the situations expected in aerial combat. In this way Dynat saves time and money and gives a complete evaluation under all conditions required for combat readiness.

General Electric believes it has the answer to this problem with DYNAT; here's why:

1. Simulates air battles on the ground
DYNAT can be used for complete armament system and component evaluation. It tests the actual radar tracking and actual gun firing errors while the computing system is functioning. It consists of a group of units designed to simulate the duel conditions and provide continuous evaluation records of the problems that an armament system meets during the actual duels.

2. Tests effects of own ship's motion
DYNAT tests the ability of the armament system to compensate for its own ship's motion.

3. Radar noise
DYNAT can test the effects of radar noise, either atmospheric, system, or target generated.

4. Shock and vibration testing
DYNAT can test the effects of ship's vibration, shock, and any other circuit noise that might be encountered in actual flight firing.

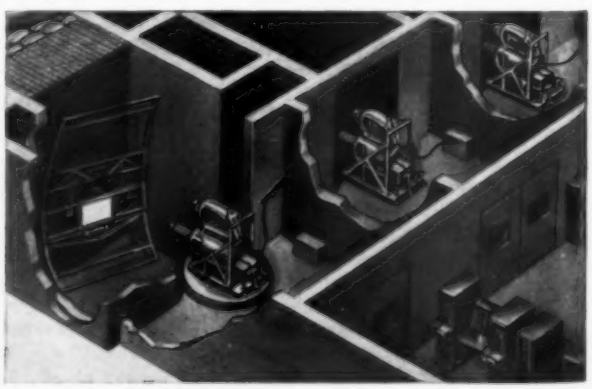
5. Windload effects
Windload conditions on the armament system with DYNAT can be simulated with weights and shock cords such that the proper load is applied to the weapon for a given angle of firing and condition of flight.

6. Complete environmental testing
Installation of DYNAT in G.E.'s all-angle firing lane permits full firing evaluation at any temperature from −100 F to +160 F.

DYNAT SIMULATES ACTUAL FLIGHT.
Every flight condition can be simulated by DYNAT. The fire control system tracks, computes, and *fires* in an environment which closely approximates its operational habitat; the effect on the armament system can then be evaluated through DYNAT. DYNAT results can then be checked airborne by flying only a fraction of the flights required on present full-scale airborne tests. The fact that DYNAT can simulate actual flight tests relatively quickly and inexpensively will permit the accumulation of statistical data from a far greater number of simulated air-duel courses than is normally possible in actual flight testing.

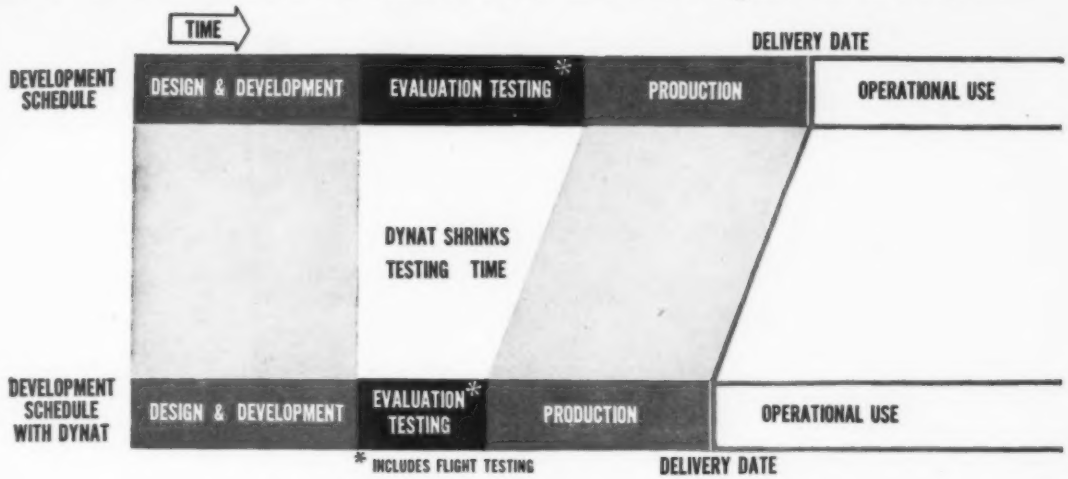
For more information on DYNAT, contact your nearest G-E Apparatus Sales representative, or write for bulletin GEA-6345, General Electric Company, Section 210-99, 1 River Road, Schenectady, N. Y.

DYNAT control console records both correct answers to attack problem and armament system's computed solution.



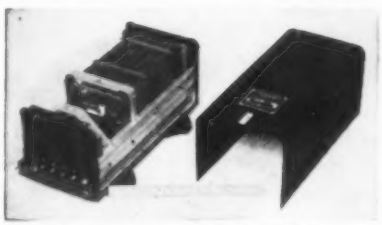
Foreground shows General Electric's all-angle firing lane with DYNAT installed. Console is in outer control room.

Here's how DYNAT reduces over-all development schedule



DYNAT's ability to reduce evaluation testing time will help to get operational systems in service sooner.

G-E Transformer-Rectifier operates at higher ambient temperatures



Weight of new unit is only 23.5 lbs.

General Electric's latest addition to a new line of transformer-rectifiers is model 6RS705F2. Weighing only 23.5 pounds, it actually betters the demands of MIL-P-7212 requirements. It can operate without derating up to 60,000 ft. at 20 C, or at sea level up to 110 C. A 5 KW unregulated unit for use in missile applications has also been developed, weighing 32.5 lbs. and a new design of a 12 amp. (4½ lbs.) unit has been completed.

OTHER DESIGNS AVAILABLE.

Many designs are available along with application engineering services on new and very special units, including units without built-in cooling means which can be utilized with blast cooling furnished. Silver-zinc battery charging tests have been made on the 200 amp regulated units, and test reports are available on request.

Latest G-E developments indicate that an 18 lb., 100 amp unregulated unit is now possible (MIL-P-7212), and a 55 lb., 200 amp regulated unit is in the immediate future. To reduce weight of regulated units, new circuit developments are being investigated such as the use of zener diode reference circuits and ampliformers. Use of Silicon broad area rectifiers is under study.

General Electric has done pioneer work in reducing size and weight of regulated and unregulated airborne power supplies. Check your nearest G-E Apparatus Sales representative for further information, or write for bulletin GEA-6443, Section 210-99, General Electric Co., Schenectady 5, New York.

New servo motor operating on B-47

Developed as part of a servo mechanism in the gun directional computer system for the B-47, General Electric's new miniature d-c aircraft motor is but 1⅝ inches in diameter. Weighing 8 ounces, it operates equally well at sea level or at 50,000 ft. provided the ambient at altitude is at the lower end of the temperature range as stated in the general motor specifications.

DESIGNED FOR THESE APPLICATIONS

The new motor is designed to meet the intent of the military specification MIL-M-8609 (ASG), and the extreme environmental conditions of this spec for short periods of time. It can be used as a prime mover in a gun directional computer system, in electronic devices, and can be modified for other aircraft and missile applications requiring a reversible motor capable of giving a high speed of response. It can also be geared to very low speeds where applications dictate.

NEW MOTOR HAS THESE FEATURES

Rated at 0.002 hp at 6500 rpm, the new, miniature d-c motor is built with Nicalloy punchings and pole pieces to meet the rigid humidity requirements given in the specifications. It is not restricted to any one type of operation, but has the advantage of a small time constant and good efficiencies in applications where small power outputs are required.

For further information on this new motor check your nearest G-E Apparatus Sales representative or write for bulletin GEA-6314, Section 210-99, General Electric Co., Schenectady, New York.

G-E servo motor is used in B-47 gun directional computer system.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Industry News Digest

Three Canadian Firms To Work on Missile

Three Canadian companies will work together to produce the U.S.-developed Sparrow air-to-air guided missile under license for RCAF. The project will be under direction of A. V. Roe Canada Ltd., Toronto; Canadair Ltd., Montreal, will build the airframe and Canadian Westinghouse Co., Hamilton, the electronic guidance system.

Sparrow was chosen for its comparative simplicity and low cost. It has three or four types of missile heads. "We are still working out which one we will use," Defense Research Board chairman A. H. Zimmerman said.

Considerable work will be required to adapt the Sparrow to Canada's CF-100 and its successor, the CF-105. The CF-100 will be able to carry several missiles under the wings.

Canada is continuing work on the Velvet Glove (Canadian air-to-air development) to keep her guided missile team together.

Canada has no immediate plans for entering the field of surface-to-surface guided missiles, Zimmerman revealed.

AMC Studies Need For Giant Alcoa Press

Need for construction and installation of a 20,000-ton-capacity extrusion press at Aluminum Co. of America's plant in Lafayette, Ind., is being studied by Air Materiel Command. Decision is expected in about a month.

Alcoa's 14,000-ton Schloemann extrusion press at Lafayette is now being operated three shifts daily on a seven-day work week. The 20,000-tonner, designed and partially built by Loewy Construction Co., was dropped from USAF's original heavy press program when the number of presses was cut from 17 to 10.

Southwest Airways Plans to Buy F-27s

Southwest Airways is the third U.S. local service airline to indicate plans to buy the Fairchild/Fokker F-27 turboprop as its answer to the "DC-3 replacement."

In its application to CAB for a new Sacrament-Las Vegas segment, Southwest said it would serve these cities with 280-mph Martins and plans to place 40-passenger F-27s in service in the spring of 1958.

Fairchild officials confirmed that negotiations are under way on a possible F-27 purchase by Southwest.

West Coast Airlines and Bonanza Air Lines already have indicated fairly certain plans to buy F-27s.

Rizley Awaits Senate Action on Judgeship

President Eisenhower nominated Ross Rizley, chairman of the Civil Aeronautics Board, to serve as federal judge for the western district of Oklahoma, but Rizley is expected to remain in his job pending Senate confirmation.

At presstime the White House had taken no action on appointment of a successor to Rizley as CAB chairman. Leading candidate was still reported to be Val Peterson, Federal Civil Defense Administrator.

Donald Douglas Buys 15,000 Shares of Douglas

Donald W. Douglas, president and board chairman of Douglas Aircraft Co., bought 15,000 shares of Douglas stock Jan. 5, one of the largest purchases of an aircraft stock ever made by a company officer.

The New York Stock Exchange purchase list did not indicate that Douglas' acquisition was under an exercise of option. At Jan. 5 market price, the 15,000 shares would have cost $1,293,750. Douglas now holds 38,100 shares worth $3,024,378 at recent market quotations.

News Briefs

• McLean Development Laboratories, Inc., New York, has received follow-on orders from Grumman and McDonnell for explosive bomb ejectors that have boosted company's backlog for the devices to over $5 million.

• Brotherhood of Railway Clerks' strike against Western Air Lines was in its seventh week at presstime, and the union had turned down the company's latest wage offer. Negotiations were scheduled to be resumed upon return to Los Angeles of Leverett Edwards, chairman of the National Mediation Board.

Trans-Canada Air Lines has ordered 11 additional Viscounts at a cost of $12 million. This brings TCA's Viscount fleet in service and on order to 36 aircraft, representing a total investment of $37 million. TCA took delivery of its 15th Viscount this month. Three more will be delivered in the spring and seven more by the end of March 1957. The latest re-order, involving 11 aircraft, will be delivered starting in May 1957.

• Option on three additional Viscount 810/840s has been exercised by Continental Air Lines, and additional option has been taken on five more. CAL's total order is now 15, worth $22,714,800.

• The Glenn L. Martin Co.'s new $20 million guided-missile plant, on a 7,000-acre site 15 miles southwest of Denver, is scheduled for completion by Nov. 1.

• Aluminum producers have been directed by Business and Defense Services Administration to reserve 150 million pounds of second-quarter output to meet requirements of military and atomic contractors. This is 5 million pounds more than in current quarter.

• Douglas Aircraft Co. has completed delivery of 166 military DC-6s (Navy R6D-1, AF C-118A) valued at $193.5 million.

• American Helicopter Division of Fairchild Engine & Airplane Corp., located at Costa Mesa, Calif., has been renamed the Electrotechnics Division, because the name is more appropriate in describing its present activities. Fairchild president Richard S. Boutelle said the change didn't necessarily mean the company has abandoned efforts in the rotary wing field. "Development of a practicable logistics support aircraft capable of short (STOL) or vertical (VTOL) take-off and landing is now an integrated effort within our Aircraft Division at Hagerstown, Md.," he said.

• Northwest Airlines will buy eight to 10 jet transports by June, according to president D. W. Nyrop.

Facilities

Boeing Airplane Co.'s $29.5 million facilities expansion program includes $21-million developmental center at Seattle and $8.5 million manufacturing and office facility at Renton, Wash. The 1,021,000-sq. ft. Seattle addition, to be completed in late 1957, will handle work on certain phases of Bomarc, physical research structural testing and experimental work. Renton (558,000 sq. ft.), home of company's new transport division, will assemble body sections for 707 jet.

Ramo-Wooldridge Corp., Los Angeles, will build a $5.5 million plant near Littleton, Colo., southeast of Denver. At the outset, plant will produce fire control systems for military planes, radar systems, electronic computers and advanced communications equipment. Ground will be broken in May or June. About 1,500 will be employed if facility is used to full capacity, and annual sales will be $25 million. There has been speculation that plant will provide guidance equipment for second intercontinental ballistic missile which The Glenn L. Martin Co. will build at new Colorado installation.

Marquardt Aircraft Co., Van Nuys, Calif. will build ramjet production and testing facilities near Ogden, Utah. Production plant, adjacent to Ogden Municipal Airport, will cost $4 million to $5 million. Cost of test facility has not been determined. Initial employment will be 800 to 1,000, building to 3,000-4,000 in next four to five years.

IT ALWAYS PAYS TO
GIVE 'EM WHAT THEY WANT

More people by far...use

HERTZ
Rent a car

Airline officials were quick to recognize the built-in advantages of Hertz' Plane-Auto Travel Plan.

By solving off-line and final destination problems, Hertz has almost single-handedly created thousands of new passengers for air travel.

And smooth Hertz service assures extra good-will! When an airline recommends Hertz, it is suggesting the oldest and largest car rental service in the world—the most advertised and accepted, too. People expect the best from Hertz—clean, new Ford Fordomatics (or other fine cars); low rental charges that include gasoline, oil and proper insurance; car reservation service famous for reliability; courteous recognition of Air Travel Cards.

Hertz gives 'em what they want in over 950 offices in over 650 cities around the world. And for the future, Hertz is planning now to keep pace with the ever-higher standards set by America's airlines. For details call or write: Hertz Rent A Car System, Dept. C26, 218 South Wabash Avenue, Chicago 4, Illinois; phone WEbster 9-5165.

When & Where

MARCH

Mar. 6-8—Air Line Pilots Association Fourth Annual Safety Forum, Chicago.

Mar. 6-8—Air Transport Association Ticketing and Baggaging Committee, Ambassador Hotel, Los Angeles.

Mar. 6-8—ATA Standard Practices Committee, Palmer House, Chicago.

Mar. 7—IATA North Atlantic off-season fares policy group meeting, Switzerland.

Mar. 9—IAS 11th annual flight propulsion meeting (confidential), Hotel Carter, Cleveland, Ohio.

Mar. 12-16—ATA Chief Pilots meeting, Farmers Union Bldg., Denver.

Mar. 14-16—American Society of Mechanical Engineers, aviation division conference, Hotel Statler, Los Angeles.

Mar. 19-21—Society of Automotive Engineers, National Production meeting and forum, Hotel Statler, Cleveland.

Mar. 19-22—Institute of Radio Engineers National Convention and Radio Engineering Show, New York.

Mar. 20-21—ATA Cargo Advisory Board, Statler Hotel, Washington, D. C.

APRIL

Apr. 5-6—IRE-AIEE-ISA Conference on Magnetic Amplifiers, Syracuse, N. Y.

Apr. 9—IATA Atlantic commodity rates board, New York.

April 9-12—Society of Automotive Engineers, National aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statler, New York.

Apr. 11-13—Seventh Regional Technical Conference and Trade Show, IRE, Hotel Utah, Salt Lake City.

Apr. 15-16—Ninth Annual Conference, Airport Operators Council, Warwick Hotel, Philadelphia.

Apr. 22-26—Twenty-ninth convention American Association of Airport Executives, Hotel Carter, Cleveland.

Apr. 23-24—New England Radio Engineering Meeting, Sheraton Plaza Hotel, Boston.

April 30-May 4—Fifteenth National Conference, Society of Aeronautical Weight Engineers, El Cortez Hotel, San Diego, Calif.

MAY

May 1-3—Electronic Components Symposium sponsored by IRE, AIEE, RETMA, WCEMA, NBS, Departments of Defense and Commerce, Department of Interior Auditorium, Washington, D. C.

May 2—Fourteenth annual conference Society of Aeronautical Weight Engineers, Ft. Worth.

May 2-5—American Helicopter Society, 12th Annual National Forum, Sheraton-Park Hotel, Washington, D. C.

May 3-4—Sixth annual IAS West Coast Student Conference, Los Angeles.

May 6-9—Second National Flight Test Instrumentation Symposium, Ft. Worth, Tex.

May 14-15—National Aeronautical and Navigational Conference, Hotel Biltmore, Dayton, Ohio.

May 24-26—Tenth annual convention of Armed Forces Communications and Electronics Association, Statler Hotel, Boston.

May 27-June 3—Annual Convention, Aviation Writers Association, San Francisco.

JUNE

June 3-8—Summer meeting Society of Automotive Engineers, Hotel Chalfonte, Atlantic City.

June 6-8—American Society for Quality Control, Palais Du Commerce, Montreal, Canada.

June 17-21—Semiannual meeting American Society of Mechanical Engineers, Hotel Statler, Cleveland.

June 19—Tenth session of International Civil Aviation Organization Assembly, Caracas, Venezuela.

GROWING CONCERN over U.S. ballistic missile progress could have important consequences for the aircraft industry. And it will figure in the upcoming presidential campaign (see page 23).

Politically, Trevor Gardner's resignation from Air Force and his sharp attack on Administration's defense policies couldn't have come at a better time for Democratic leaders. It gave them powerful support for their campaign against President Eisenhower's military program. Up to now, military policies have been almost immune to Democratic criticism.

Economically, the ballistic controversy may open the door to fatter appropriations for airpower than requested by the Administration. This could upset Republican's carefully balanced budget for coming fiscal year. And it could pave the way for higher level of activity for aircraft industry than now foreseen, both in procurement and in research and development.

———— • ————

OBLIGATIONS FOR NEW AIRCRAFT by USAF finally started topping "deobligations" with fiscal 1956 half over. In July-November period, cancelations and fund transfers caused deobligations for planes and related items of $273 million. But December contract awards hit $1,456,000,000, bringing half-year obligation total to $1,182,000,000.

Latest report on funds available: at end of calendar 1955, USAF's unobligated balance for planes and related items was $9,441,000,000. Navy's balance totaled $3,499,000,000.

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GUARANTEED ANNUAL WAGE DEMAND will be coming up in aircraft industry-labor negotiations. (AMERICAN AVIATION, July 4, 1955, p. 28). United Auto Workers' local has already presented Douglas-Tulsa with request, but didn't spell out details. UAW aviation officials previously indicated GAW would be sought this year, but added that "special conditions" of the industry would be taken into account.

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ENTHUSIASM FOR TURBO-FAN ENGINES is waning in U.S. and British air forces. Rolls-Royce Conway and General Electric X-84 were privately-financed ventures which the two companies hoped RAF and USAF would buy. But RAF has abandoned proposed Conway-powered Vickers 1000 military transport. USAF has ruled against any early use of X-84. Companies are still hopeful that engines will be bought, but current prospects aren't bright.

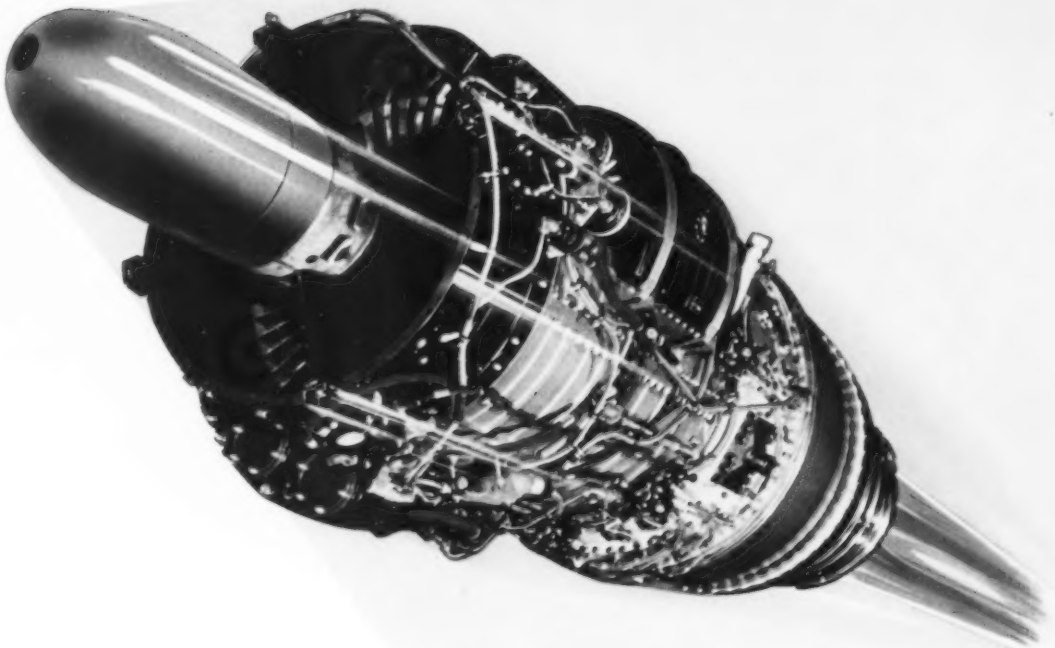
———— • ————

RACE FOR BRAIN POWER continues as one of biggest elements in U.S.-Russian battle for technological supremacy. Availability of engineers could be a deciding factor.

Current U.S. position isn't good. Russia has a 3 to 1 ratio of students studying the physical sciences to those studying in humanities. U.S. has ratio of over 2 to 1 studying humanities over the sciences. Added incentive: top Soviet scientists often receive 50% of their income on a bonus basis.

———— • ————

USAF'S PRELIMINARY ORDER for Convair XB-58 supersonic delta bomber (Hustler) has been cut from 30 to 13. Some observers insist this could mean that the plane, due to fly later this year, won't be a large-scale production model.



Judge
a Product
by
its Users

Sensational power plant for the speediest of military planes is the Curtiss-Wright J65 jet engine. On the W3 model, significant savings in weight have been achieved by using Aeroquip 601 Lightweight Engine Hose and patented ***"little gem"*** Fittings for fuel and oil lines.

Aeroquip

Aeroquip Corporation, Jackson, Michigan • Aero-Coupling Corporation, Burbank, California (*A subsidiary of Aeroquip Corporation*)
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Local Representatives in Principal Cities in U.S.A. and Abroad. Aeroquip Products are fully Protected by Patents in U.S.A. and Abroad. ***"little gem"*** is an Aeroquip Trademark

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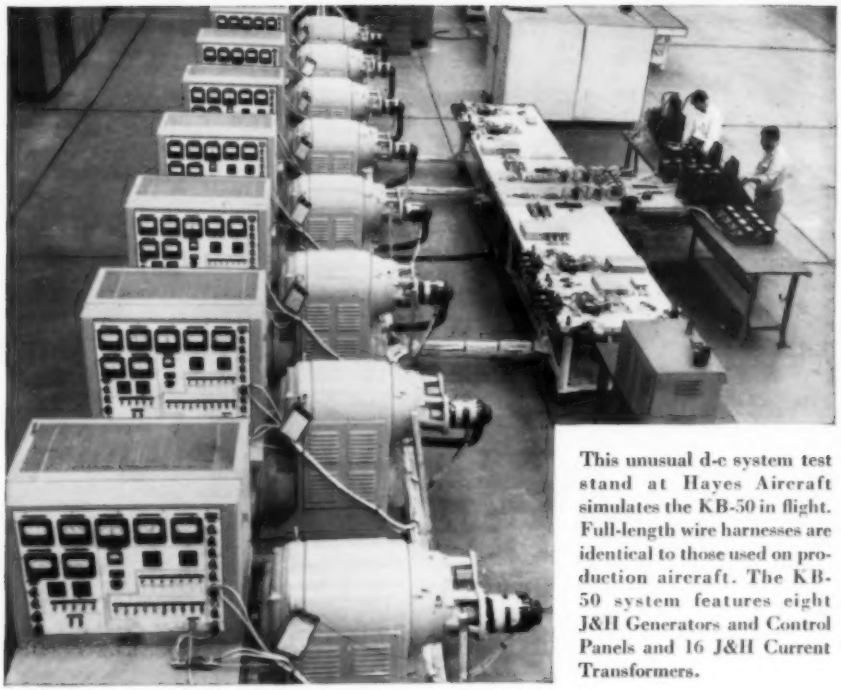


This unusual d-c system test stand at Hayes Aircraft simulates the KB-50 in flight. Full-length wire harnesses are identical to those used on production aircraft. The KB-50 system features eight J&H Generators and Control Panels and 16 J&H Current Transformers.

8 Jack & Heintz Generators paralleled in unique d-c system!

. . . engineers achieve 78% more power for KB-50

The KB-50 will have tremendous refueling capacity. Plans call for fueling of three planes simultaneously.

Jack & Heintz G23 Generator

Rating—amp	400
Voltage—d-c	30
Speed Range—thousand rpm	3.8-8
Weight—lb	67
Dimensions—inches	
Over-all Length (from mounting flange)	13 31/32
Over-all Diameter	8
Bolt Circle Diameter	5
Spline, Pitch Diam	.8
Air Inlet Conn., OD	3
Cfm of Air at 6" H_2O & 6000 rpm	165
Rotation as Viewed from end Opposite Flange	CW

In converting the Boeing B-50 Superfort into the KB-50 mid-air refueling tanker, a substantial power boost was needed to drive the array of rapid-transfer fuel pumps honeycombed throughout the plane.

The approach lay in developing a new higher rated generator or in paralleling eight available 400-amp machines.

The Jack & Heintz G23 d-c Generator proved to be the answer. Rugged enough to withstand the high vibration characteristics in the KB-50, this generator required only a specially machined housing and a modified mounting flange.

Through the use of the G23, Hayes and Jack & Heintz engineers have achieved a power supply of 3200 amps in the same available space once yielding a maximum of 1800 amps. The unprecedented paralleling of eight generators has been test-proved completely reliable.

Also available is a modified G23 with an increased rating of 450 amps, which is ideally suited to airline applications.

For complete information, write Jack & Heintz, Inc., 17633 Broadway, Cleveland 1, Ohio. Export Dept.: 13 E. 40th St., New York 16, N. Y.

JACK & HEINTZ *Rotomotive* AIRCRAFT EQUIPMENT

Production Spotlight

• Allison has received a development contract from Navy BuAer for a turbojet in the 25,000-lb. thrust class. Action is in line with joint Navy-AF "10-year Powerplant Development Program."

• Air Force plans to use General Electric-developed X-84 ducted fan engine have been shelved—at least temporarily. G. E. still is hoping to sell the powerplant both for military and commercial use.

• Ryan's Avon-powered vertical takeoff jet aircraft is flying, but the company considers it only a test-bed to prove a principle, rather than the forerunner of a production airplane. USAF has labeled the Ryan vehicle the X-13.

• Fairey Aviation is starting production of the Fireflash air-to-air guided missile for use by RAF fighters. Missile uses solid propellant rockets.

• Rolls-Royce has been working on an atomic engine for aircraft 18 months. A nuclear research lab will be opened in early spring.

•Picked by the Army to be the weapons system contractor on the 1,500-mile missile being developed at Redstone Arsenal was Chrysler Corp. of Detroit, which already holds limited production contracts on the existing 200-300 mile range Redstone. Chrysler, producing Redstones at a Navy-owned plant built to turn out J48 turbojets, was selected because it is most familiar with the work going on at Huntsville, Ala.

• General Electric's Aircraft Gas Turbine Division has broken off discussions with Britain's Napier company about building the Eland turboprop under license. G. E. now is considering becoming a licensee for the Bristol B. E. 25, if Curtiss-Wright does not exercise its option.

•Rome Air Development Center will soon start a side-by-side evaluation of two new airport surface detection equipment (ASDE) radar developments. One, developed by Airborne Instruments Laboratory, Mineola, N. Y., has been under test at MacArthur Field for several weeks and is considered in the $75,000 to $100,000 range. Second unit is a "poor man's" ASDE priced at about half that figure, developed by Decca Navigator System, Inc. Project is a joint USAF-Air Navigation Development Board activity. AIL unit is eventually slated for operational evaluation at Idlewild (N. Y.) Airport.

• The Frye Corp. plans to sell its first 15 F-1 four-engine transports as cargo carriers in order to accumulate operating experience with the new aircraft before passenger versions are sold.

•Modified Lockheed T-33A USAF trainer fitted with a "purge mat" system to prevent combat fuel fires has been delivered to Wright-Patterson AFB by Thieblot Aircraft Co., Washington, D. C. System weighs about 80 pounds and involves some 330-inert-gas filled rubber bags installed between T-33 fuel cells and structure. Purge mats were developed for Thieblot by Goodyear Tire & Rubber Co.

• Bristol has scrapped the "Super Britannia" project to put a new thin wing on the turboprop. Instead, the company will offer a completely new airplane, the 187, which will be a double-decker in the 500 mph class and powered by four B. E. 25 turboprops. Availability: early 1960s.

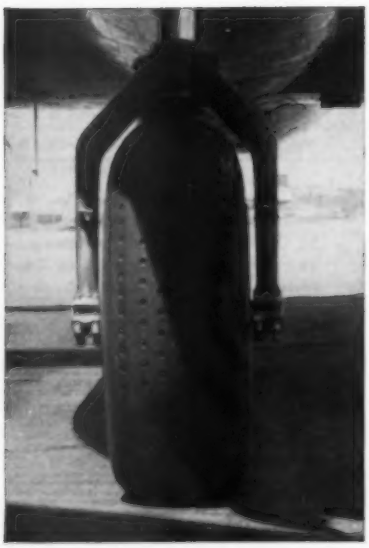
• Handley Page is reported to be presenting a militarized version of the Herald to meet a specification for a medium-sized RAF transport to replace the twin-engine Valetta.

• General Electric is testing two promising "exotic" jet engine fuels at its Evendale, Ohio, combustion laboratory. Neither is a hydrocarbon.

• Two European manufacturers, France's Breguet and Holland's Fokker, have signed an agreement of general cooperation. If either company has more work than it can handle, it will subcontract the surplus to the other. Sncsao will cooperate with Breguet on any subcontracts placed by Fokker under the agreement.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Tubeless to save weight, Dimpled for more landings



THE B. F. GOODRICH Dimpled Tubeless Tire combines the most advanced tread design with the most advanced tire construction. It prolongs service life and, by eliminating the tube, reduces weight.

A recent airline comparison test showed that the B.F.Goodrich Dimpled tread outlasted other leading brands. Reasons? It is better protected against tread cutting because dimple-like indentations result in better tread load distribution. Wear is slower, more even. The tread also has a broader footprint so wear is spread more evenly from shoulder to shoulder. Result: more landings before recapping.

And B. F. Goodrich Tubeless Tires make greater pay loads possible. One airline reduced weight as much as 120 pounds under regular tires and tubes, another airline 48 pounds. These tires save time and money in warehousing and maintenance, too. Instead of a tire and tube, there's only the tire to purchase and stock—only the tire to mount and service.

B. F. Goodrich commercial type Tubeless for airliners and high pressure Tubeless for fast fighters are in full production. Both are examples of B. F. Goodrich pioneering and leadership in Tubeless—in the air and on the ground. *The B. F. Goodrich Company, Tire and Equipment Division, Aeronautical Sales, Akron, Ohio.*

B.F.Goodrich
AVIATION PRODUCTS

Tires, wheels, brakes • De-Icers • Heated rubber • Fuel cells • Avtrim • Pressure Sealing Zippers • Inflatable seals • Rivnuts • Hose, accessories

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ESTABLISHED JUNE 1, 1937

World's Largest Aviation Publishers
American Aviation

VOL. 19, NO. 20

Political Kettle Boils Over Missile Issue

- **Resignation of Trevor Gardner touches off new Democratic onslaught against Administration's military policies.**
- **Former R & D chief says Air Force needs $3.5 billion more in 1957 budget.**

By HENRY T. SIMMONS

The U.S.-Soviet race for the ballistic missile crashed into the national political scene in a big way this month. Every sign indicated that the administration's ballistic progress—or lack of it—would become a major 1956 presidential campaign issue.

Democratic lawmakers, spearheaded by Sen. Stuart Symington (D-Mo.), launched the most determined onslaught to date against the President's military policies. They charged that Russia has forged into the lead in perfecting intercontinental and intermediate range ballistic missiles, while the U.S. is conducting its own programs on a "business as usual" basis.

The resignation February 11 of Trevor Gardner, Assistant Secretary of the Air Force for Research and Development, added new fuel to the Democratic attack. Gardner called for a "crash" program to develop the superweapons and declared that an additional $200 million was needed for Air Force research and development for both the current fiscal year and for fiscal 1957.

• **Congressional committees** scrambled to line up Gardner for testimony on the Air Force ballistic program, confident he would produce considerable embarrassment for the Administration.

This guess proved correct. Not only did Gardner make a pitch for speeding the ballistic missile and for more R&D money, but he also broadened his financial complaints to take in the whole Air Force. He reportedly told a House Appropriations Subcommittee headed by George Mahon (D-Tex.) that the Air Force needs $3.5 billion more than the $16.5 billion requested by the Administration for fiscal 1957.

Gardner stated that the Air Force's original estimate of its need for new funds totaled $20 billion, but that it trimmed this to $18.8 billion. The Defense Department subsequently lopped $2.3 billion from this estimate—including $1 billion for aircraft procurement, $600 million for procurement of continental defense equipment and other hardware, $400 million for maintenance and operations and $300 million for base construction and R&D, he said.

Contradicts Eisenhower

Soothing words from President Eisenhower, AF Secretary Donald Quarles and Defense Secretary Charles Wilson failed to quiet the clamor from Democratic ranks. If anything, they inspired new attacks. Symington, a former AF Secretary, flatly contradicted President Eisenhower's assertion that the U.S. ballistic program "is being researched and developed as rapidly as it can be done in this country."

Said Symington: "Regardless of source, the President is badly informed if he believes this country could not move faster in the missile field."

Quarles told an audience in Texas: "In spite of all one hears about the danger of our losing the technological race —and we certainly must continue to take this race very seriously—I see no possibility that any technological development now conceived could upset our very broadly based deterrent position, assuming, of course, that we press ahead with our programs."

Wilson, who was still looking for a new assistant to coordinate the Pentagon missile program, declared it is "getting better organized all the time." He added: "I don't think the people of the country generally appreciate the work that has been done and the investment that has been made—that we have such big projects going as we have."

• **In all the political furor** over the nation's ballistic program, the Air Force's real needs were obscured. Democratic lawmakers looking for issues which would discomfit the Administration pinned their entire attack on development of the ballistic weapons, and managed to convey the impression that the additional research funds sought by Gardner were to be devoted entirely to them.

This is not the case. Since the acceleration of the intercontinental and intermediate range weapons was announced last November, sufficient funds have been available to press the projects. The heart of the problem is this: no additional R&D funds were made available to the AF, and Gardner and his aides had to dig up the necessary money from other areas of the R&D budget. "The result," said one official, "is that other crucial projects will either be seriously retarded or absolutely eliminated."

As a matter of fact, it's doubtful whether Gardner would have applied any of the additional $200 million he wanted for R&D for fiscal 1957 to the AF's three ballistic projects (the Convair/Ramo-Wooldridge Atlas, the Martin WS-107 and the intermediate range missile assigned to Douglas.) Said one high AF budget official: "Any shortage Trevor may have contended there was in R&D certainly was not in the ballistic missile program."

Even though they feel the ICBM and IRBM projects have sufficient money behind them, many AF military men privately agree with Gardner that the program should be sharply accelerated from an administrative and management standpoint. They feel the appointment of a special missiles "czar" by Wilson is a step in the right direction, but they are by no means confident that an official acting at a staff level is the answer to the problem.

What's a Stable Program?

• **The real** Air Force complaint in the research and development area is with the Administration's notions of what constitutes a "stable" R&D program. "The fundamental purpose of R&D," maintains a top AF development

official, "is the production of advanced weapons systems superior to those of a potential enemy."

"In 1935, we produced the B-17 weapons system for $500,000. It was the longest range bomber then in existence, and it far exceeded anything the Russians then had in sight. Today it costs 50 times as much to develop just one long-range bomber superior to Soviet models."

"But if you hold the R&D program to a stable dollar input while weapons development costs rise steadily, how can you achieve your fundamental R&D objective—stable production of advanced weapons systems?"

Implicit in this idea is Gardner's theory that technological development should be supported at a reasonably increasing rate to take advantage of new avenues constantly being opened by research progress. In terms of dollars, applying this approach to military R&D would mean a very substantial and continuing increase in appropriations for such activities. AF officials concede it could not go on without some limit, but they feel it is essential if the U.S. is to match Soviet strides.

Air Force anxiety is by no means limited to the R&D program. Gen. Thomas D. White, Vice Chief of Staff, USAF, warned in Cincinnati recently that the U.S. margin of air superiority over the Russians is thinning rapidly because of Soviet speed in turning out new aircraft.

"The Soviets are presently beating us at our own game—production," he declared. "They have halved our lead-time on the heavy jet bomber, and in developing and producing all other aircraft, their lead-time is considerably less than ours."

In one of the most pessimistic pronouncements yet made by an AF officer, White said: "In airplane after airplane they are approaching us in quality and surpassing us in quantity. We believe we still have a better air force—but that superiority now rests almost entirely upon our better system of worldwide bases and upon our better and more experienced crews."

• **In any other year,** gloomy statements by high military officers regarding enemy strength and U.S. weakness would probably be written off as the usual maneuvering which precedes appropriation hearings. This year, however, the defection of Trevor Gardner and his attack on the Administration's dollar curb on the Air Force could alter the situation drastically.

Just what Congress will do cannot be predicted. Gardner's resignation and his campaign for more money will certainly make life difficult for Wilson, Quarles and other high Pentagon civilian officials. It could put AF Chief of Staff Gen. Nathan Twining and his top commanders on the spot also.

But whether Gardner's actions and the concern of the military men will lead to higher level of Air Force appropriations than that requested by the Administration is another matter. Furthermore, even should additional money be granted, there is no certainty that Wilson would not impound it as he did last year when Congress voted extra money to prevent a 22,000-man slash in the strength of the Maine Cops.

• Should Congress vote extra money, and should the Administration feel compelled to make it available for military use as directed, the result could wreck the Administration's hopes for a balanced budget in fiscal 1957. The Republicans may be expected to resist that outcome, but whether they could succeed against determined Democratic pressure is an open question at this time.

Congressional Leaders Call for More Emphasis on ICBM

Senators Jackson, Symington and Margaret Smith tell AMERICAN AVIATION increased efforts are needed to assure U.S. superiority.

By FRANCIS J. KEENAN

A crash program in the IRBM and ICBM fields grows daily as a distinct possibility.

If it comes, intensified pressures from Capitol Hill will be largely responsible.

These views gained substance from an exclusive survey of top-level Senate and House leaders in military policy conducted this month by AMERICAN AVIATION. Subsequent developments, principally the aftermath of former AF research boss Trevor Gardner's resignation, have strengthened the conviction in many places that Congress will act firmly to assure maximum progress in long-range missile development before the spring is over.

Five Senators and one Representative, all key members of Congressional Armed Services and Appropriations committees, joined the magazine's symposium.

•**In sum,** these are the principal findings of the survey:

• Only one participant, Sen. Styles Bridges (R-N.H.), expressed unqualified confidence in the adequacy of proposed aircraft and missile programs.

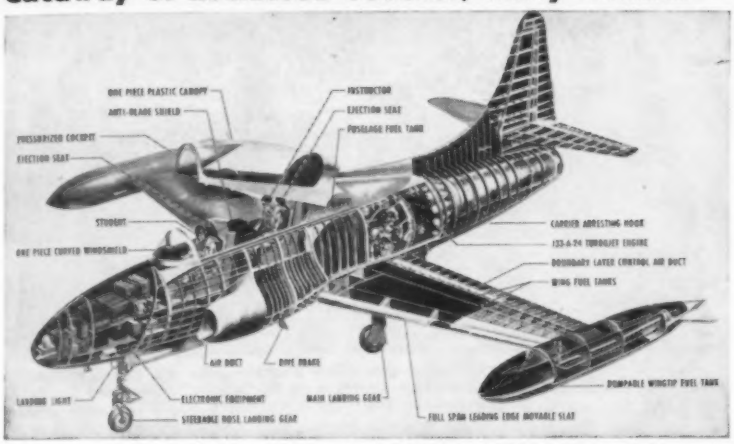
• Three "panelists"—Senators Henry Jackson (D-Wash.), Stuart Symington (D-Mo.) and Margaret Chase Smith (R-Me.)—strongly urged increased efforts to assure U.S. air superiority, especially in the missile field; two others —Sen. Leverett Saltonstall (R-Mass.) and Rep. George Mahon (D-Tex.)— referred to their own current efforts to see if sufficient funds are being spent for the right purposes.

• Mrs. Smith became the first Senate Republican to call directly for plac-

AF Orders More Matador Missiles

Air Force has recently announced additional orders for a substantial number of TM-61 Martin Matador tactical missiles, shown here in quantity production. The Matador, first AF missile to gain operational status, has been in production since January 1951. Use of new manufacturing techniques, primarily aluminum honeycomb bonded-metal structures, make Matador wing construction possible in only 25% of time required by conventional fabrication processes. As a result, Martin officials say, the Matador represents the lowest USAF cost item in dollars-per-airframe-pound.

Cutaway of Lockheed SeaStar, Navy Trainer



Drawing of Lockheed Aircraft Corp.'s new T2V-1 Navy trainer, the SeaStar, reveals details of design improvement which add safety to jet flight. First jet trainer designed for carrier duty, the SeaStar introduces boundary layer control to increase lift and improve wing performance. BLC pipes air out over trailing edge.

The T2V-1 lands at 97 mph, slowest of any jet. Cutaway also shows elevated rear seat for instructor, leading edge slats for stall protection and location of BLC ducts. The SeaStar withstands sink rate of 17 feet per second.

ing the ICBM program "on a crash basis."

• Sens. Bridges and Saltonstall considered current renegotiation powers "sufficient" to check defense profits and advocated extensions of the Renegotiation Act; Rep. Mahon supported extension of the Act but considered its powers insufficient to contain profits.

• Democrats unanimously recognized the "possibility" that the U.S. may be placing "excessive reliance" on nuclear-air power at the risk of incapacity to fight any but a major nuclear war. Republicans, however, felt a proper balance has been achieved.

• Prospects for atomic-powered aircraft drew a blank; Sen. Smith and Rep. Mahon considered it strictly secondary to missile developments, while the others ignored the subject.

Of major significance among questionnaire replies, however, was Sen. Smith's outspoken endorsement of a crash program for the ICBM, and her companion promise "to support a crash program" in the Armed Services and Appropriations committees and on the Senate floor. On a close, partisan division in either committee, her vote could be decisive.

Sen. Smith: 'Keep Ahead'

The Maine Republican, first of her Party's spokesmen to voice such positive sentiments, wrote:

"If the intercontinental ballistic missile is the foreseeable ultimate for our defense, then the program on it should be given priority over everything else; and it should be placed on a crash basis. We don't know what Russia has on an IBM. But it would be wise for us to proceed on the basis that she has all she claims—and for our country not to be behind even her claim, much less her actual attainments on an IBM."

Two big qualifications must be entered, however, lest undue emphasis attach to Congressional efforts to break through Administration defense spending limits:

(1) Top Congressional leaders have not yet committed themselves. Men like House Speaker Sam Rayburn, Appropriations Committee Chairman Clarence Cannon, Armed Services Committee Chairman Carl Vinson, and Senate Majority Leader Lyndon Johnson, Appropriations Committee Chairman Carl Hayden and Armed Services Committee Chairman Richard Russell—these men may call the tune, and their thinking is not yet publicly known.

(2) Even if Congress orders a crash program or speed-up in aircraft or missile work, and votes the added funds, precedent exists for an executive veto in the form, for instance, of impounding unasked funds.

Meanwhile, demands for immediate action have won wider, and more sympathetic attention in Congress.

Trevor Gardner testified last week in secret sessions of the House Defense Appropriations Subcommittee where, according to at least one member, he "made a good case" for $200 million in additional R&D funds for the Air Force.

In the Senate, two major addresses by Senators Jackson and Symington drew unusually warm support from colleagues. No less than 12 Senators rose to endorse, directly or indirectly, their warning that the U.S. was losing air superiority and urgently needed to win the all-out race for the ICBM. They included: Senators Mansfield (D-Mont.), Stennis (D-Miss.), Kennedy (D-Mass.), Gore (D-Tenn.), Monroney (D-Okla.), Anderson (D-N.M.), Long (D-La.), Barkley (D-Ky.), Ervin (D-N.C.), Douglas (D-Ill.), and Clements (D-Ky.).

Five Specific Questions Asked

Here are the five specific questions asked by AMERICAN AVIATION and the answers (Sen. Saltonstall prefaced his remarks by pointing out he was given very little time in which to prepare the answers):

Q. What is your reaction to the fear sometimes expressed that excessive U.S. reliance on nuclear-airpower may create a situation where the U.S. is incapable of fighting anything but a major nuclear war?

REP. MAHON: I doubt that we are relying excessively at this time on nuclear airpower, but there is a definite danger here. We cannot afford to be incapable of waging something less than a major nuclear war.

SEN. SMITH: The implication of this question really is directed at the ratio of ground forces to nuclear-air forces. It assumes an absence of flexibility in our nuclear-air forces. That is a false assumption, for our nuclear power is not limited to mass, strategic use but also includes tactical capability and use by ground forces.

The mere fact that development of nuclear power is constantly increasing the firepower of the foot soldier, as well as the bomber, naturally tends to lessen the need in numbers for combat manpower as machines replace men. Of course, machines can never replace men completely because there will always be a need for men—however decreasing—to run the machines.

SEN. SALTONSTALL: I do not believe that those in authority in the Department of Defense are placing excessive reliance on nuclear-airpower. Our emphasis must, as they see it and as I see it, be upon the ability to deliver quick, powerful and destructive retaliation at such time as it may become necessary, but to realize at the same time the need of a well-rounded defense posture in the air, on the sea and on the land.

SEN. BRIDGES: I do not agree that the present program places "excessive U.S. reliance on nuclear-airpower." It goes without saying that if I considered the reliance excessive I would be duty bound to oppose it. Nor do I agree that there is in the present program anything that would create a situation where the U.S. would be incapable of fighting anything but a major nuclear war. I would not support the program if I thought it did.

On the broad subject: the nuclear-air-power programs we have are based on sound, long-range, military policy. After most careful analysis, I have confidence in that policy and plans being used to implement it.

SEN. SYMINGTON: There is that possibility.

SEN. JACKSON: The danger always exists that progressive reduction in our armed services will force us towards an over-reliance on nuclear air power. Balanced forces are vital to meet our varied and global diplomatic commitments. The Russians are not blind to the possibilities of striking where we are least prepared. Through multilateral and bilateral treaties we are now linked to 42 nations on six continents. Any one of these commitments might involve us in a small, "brush-fire" type of war where nuclear weapons could not—or should not—be used.

Communist aggression takes many forms. Our reaction in any particular situation must be of appropriate intensity. We cannot, therefore, allow our conventional forces to deteriorate. On the contrary, the emphasis must be on their modernization. The development of a nuclear-powered Navy must be pressed. With our land forces, we must stress the development of self-sustaining, compact and mobile battle units. Our forces must be ready to move swiftly to the point of conflict, with the type of strength that could help forestall or push back a local aggression, and not precipitate a third World War.

Supermarine Swift Gets Reconnaissance Role

Underbelly protuberance, presumably containing photographic and radar equipment, reflects the new fighter reconnaissance role given to the Vickers-Supermarine Swift. The first Swift 5s have been delivered to the RAF, soon will go into squadron service.

What Price Economy?

Q. What effect, if any, do you believe this year's (fiscal 1957) third successive reduction in expenditures for aircraft and related equipment from the peak of fiscal 1954 will have on the maintenance of sufficient U.S. airpower to meet the Soviet threat?

REP. MAHON: Soviet long-range capabilities are increasing markedly. Witness their development of the long-range bomber. Despite our buildup, we are increasingly more vulnerable to long-range attack. The Soviets are likewise more vulnerable. The 1957 airpower budget will not thrust us forward, relatively speaking. The budget places added emphasis on continental air defense.

SEN. SMITH: The obvious answer to this leading question would be "detrimental and disturbing." But I would not want to give such an answer unqualifiedly in the absence of presentation to the Senate Appropriations Subcommittee on Armed Services of information supporting the decision for the reduction.

SEN. JACKSON: The reduction in expenditures for aircraft and related equipment proposed for FY 1957 cannot help but have a serious effect on our air-atomic strength relative to the Communist position. Our large nuclear stockpile is virtually useless without superior delivery systems. Yet, despite the "step-up" ordered last spring, our B-52 intercontinental bombers are still coming off production lines in trickles. Also, the problem of replacing obsolete aircraft of other kinds is not adequately met by the Defense Department in the budget requests.

SEN. SALTONSTALL: It is not expenditure of money alone that is the decisive factor in our security. The principal factor is the capacity to build the most modern aircraft, those which will offer the most effective retaliation or resistance in event of attack. The question is fundamentally—can more money be spent *effectively* in aircraft procurement. I intend to do my utmost to determine this to my satisfaction in the weeks ahead and particularly when the Senate Appropriations Committee meets to consider the budget of the Air Force. It must be remembered in this regard that funds in "the pipeline"—that is, money previously appropriated—are still available, which must be taken into consideration relative to the amount of money on hand for this purpose.

SEN. BRIDGES: The adequacy of U.S. airpower cannot be measured simply in terms of numbers—whether they be numbers of aircraft, dollars spent, or any similar single statistic. As I understand it, it is the considered opinion of the Joint Chiefs of Staff, the Secretary of Defense, and the President of the United States that the FY 1957 budget makes necessary provision for maintenance of sufficient U.S. airpower to meet the Soviet threat. I can only concur with the judgment of these responsible officials who have all the facts available to them.

SEN. SYMINGTON: This country is in the process of losing air superiority to the Communists.

Research Problem Aired

Q. What, if any, readjustments do you feel are necessary in the level or direction of U.S. research and development activities, especially for such projects as the atomic-powered airplane and the intermediate and intercontinental ballistic missiles? Why?

REP MAHON: We are now conducting extensive hearings in search of the answer to this question. I personally feel that the successful atomic military airplane is a long way off. The greater threat, in my judgment, is the guided missile and particularly the intermediate and intercontinental ballistic missile. We must face up to the possibility that Soviet Russia may be ahead of the U.S. in development of the ICBM. Indications are that the services have or will have all the money they can successfully devote to the missile programs and recognize the importance of development in these fields.

SEN. SMITH: I am not so concerned about the atomic-powered airplane as I am about the intermediate and intercontinental ballistic missiles for it seems to me that the missiles are a step beyond aircraft, whether that aircraft is jet or atomic-powered. If the intercontinental ballistic missile is the foreseeable ultimate for our defense, then the program on it should be given priority over everything else; and it should be placed on a crash basis. We don't know what Russia has on an IBM. But it would be wise for us to proceed on the basis that she has all she claims—and for our country not to be behind even her claims, much less her actual attainments on an IBM.

SEN. JACKSON: I recently called for a new defense philosophy towards our missile program. That philosophy simply stated is: All-out effort on critical projects today to avoid all-out war tomorrow. The ballistic missile is a clear example of the type of program which demands the new defense philosophy. Russian victory in the race for the intermediate range ballistic missile could cancel out our one vital advantage over Russian air-atomic power—our system of advanced overseas airbases. Our defeat in the missile race at the hands of Russia could cause a tragic shift in the military balance of the free and Communist worlds.

The Secretary of Defense has indicated that he would appoint a full-time assistant to push our missile effort. We will not know for some months whether this particular appointment will give our missile program the necessary momentum.

SEN. SALTONSTALL: As we all know, our research and development activities relative to atomic-powered planes and intermediate and intercontinental ballistic missiles are security questions. I have confidence in Secretary of the Air Force Quarles, in Professor Hunsaker (of NACA) and in their associates and assistants. I know that they are giving these projects the highest priority attention. Of course, readjustments and changes in direction are necessary from time to time as new experimentation and new experience develop new lines of advancement. We must trust the judgment of our leading scientists in this regard and give them sufficient funds with which to accomplish their objectives. I believe we are doing this.

SEN. BRIDGES: This year the Department of Defense adjusted the direction of the military research and development program by accelerating work on

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ballistic type guided missiles, nuclear-propelled aircraft, and in fiields important to continental defense. Additional adjustments will be made as the continuing review process indicates the desirability of such changes. Projects which no longer show promise will be dropped in order that added emphasis may be placed in other areas where there is a greater chance of payoff.

It is essential that we maintain our present high level of research and development activities although we are utilizing a substantial portion of the nation's technological resources. In order to support such a program the Department of Defense has requested approximately $160 million more for research and development in FY 1957 than was obtained in FY 1956. To cope with unforeseen research and development requirements and technological breakthroughs, it has also requested a sum of $85 million in an Emergency Fund and transfer authority in the FY 1957 budget.

SEN. SYMINGTON: The research and development should be increased steadily; else we lose ground.

Excessive Profits?

Q. What are your views with regard to charges of excessive profits made by aircraft manufacturers: (a) Are current renegotiation powers sufficient to hold them in check? (b) Should renegotiation be dropped, or other controls substituted? (c) What should comprise a reasonable standard of profit?

REP. MAHON: I think the Defense Department can and should do a better job in procurement contracting for aircraft and other defense items. Our committee study is making this clear. My answer is no to the A part of the question and as to the B part, I would not drop renegotiation.

SEN. SMITH: I am open-minded.

SEN. SALTONSTALL: It is my understanding that (a) current renegotiation powers are sufficient to hold profits in check and prevent their becoming excessive. The Act expires on July 1, 1956, and, in my opinion, should be extended: (b) to my knowledge there have been no responsible suggestions made that the Renegotiation Act not be extended or that other controls be substituted; (c) a reasonable standard of profit is something which differs in various types of production. The law makes the Renegotiation Commission responsible for determining what that reasonable standard of profit should be. It must be emphasized that there are many factors to take into account in each case that may make a larger or smaller amount a fair profit. This is the responsibility of the Renegotiation Commission.

SEN. BRIDGES: With respect to the general question I am, and have always been, opposed to excess profits by aircraft manufacturers or any other defense industry. I am not in a position to know or to evaluate any specific charges of excess profits by aircraft manufacturers and I assume that the officials of Government concerned with monitoring such matters are doing their job. In addition, and as you probably know, the whole problem of renegotiation and excess profits and their legislative overtones are being thoroughly investigated by two Congressional Committees at this time—i.e. the Joint Committee on Internal Revenue Taxation and the Special Subcommittee on Investigations of the House Armed Services Committee.

In reply to subquestion (a), it is my understanding that renegotiation powers, taken in connection with other administrative and criminal laws of Government are sufficient to hold excess profits in check. I would support any legislation shown to be necessary to perfect our laws on this subject.

With respect to subquestion (b), it is my feeling that renegotiation should be continued. There are also certain other laws such as the Defense Production Act and Title II of the First World War Power Act which must be continued if control is to be maintained. On this matter also I have no information as to what additional controls might be necessary, but I would support legislation shown to be necessary to maintain adequate control.

Subquestion (c) is complex but ultimately is a matter of judgment that can only be answered after consideration of myriad factors affecting particular businesses. I am not, and I do not know anyone who is, sufficiently expert to answer this question with unimpeachable generality.

SEN. SYMINGTON: These questions I cannot answer as I do not now have the recent facts.

Course of Action?

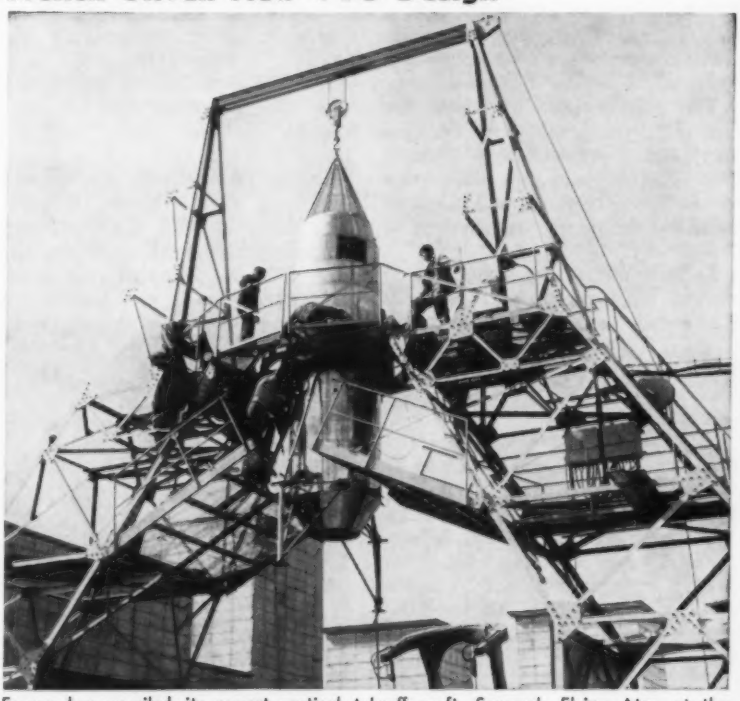
Q. What do you consider the most pressing problem Congress must act upon this year in the field of defense policy? What do you personally plan to do—or what do you expect other Congressional leaders to do about it?

REP. MAHON: The problem of determining whether we are moving in the right direction, whether we are placing the emphasis in the right places in our $35-billion defense budget for the coming fiscal year. The House Subcommittee on Military Appropriations which I head is now conducting hearings and studies in an effort to learn the facts and make appropriate determinations within our jurisdiction.

SEN. SMITH: The Intercontinental Ballistic Missile. Two things—(1) support a crash program for it as a member of the Senate Armed Services Committee, as a member of the Senate Appropriations Committee and on the Senate floor; (2) try to keep the IBM from being made a political football in an election year.

SEN. SALTONSTALL: The most pressing problem before the Congress is that of making certain to the greatest extent possible that we are creating a defensive strength composed of the most modern and efficient weapons on land, sea and in the air, in order that we may be able to develop speedy and devastating retaliation if and when required, and, very importantly, be able to maintain sufficient, well-rounded strength to follow up such action over an extended period. We must train our youth to use these weapons effectively and at the same time as safely as may be to themselves. A high morale in all services must be maintained. It is to accomplish these objectives that I

French Unveil New VTO Design



France has unveiled its newest vertical takeoff craft, Snecma's Flying Atar, at the $3-million Melun-Villaroche test center. It consists of an Atar D3Z engine enclosed in a frame the top part of which contains a radio receiver, stabilization devices and a 177-gallon fuel tank. Designated the P1, the Flying Atar derives from ramjet-powered coleopter models tested by Snecma.

shall work in this 2nd session of the 84th Congress.

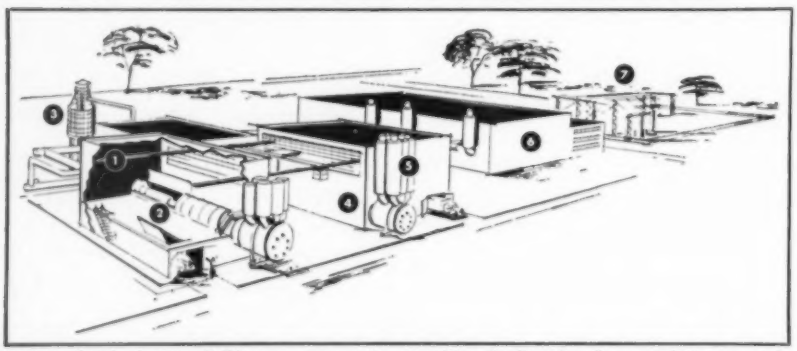
SEN. BRIDGES: I consider the most pressing problem for Congress in the field of defense policy is to continue, with the care it has exercised in the past, to examine the broad policies, as well as the factual details of the program of the Eisenhower administration to be sure that:

(1) The program is the soundest possible in the light of our present national-international problems and commitments, our national economy, and our domestic well being; and (2) the level long-range military planning be continued and further established and that every effort be made to prevent the military program from dropping into valleys or climbing to peaks with the inefficiency, waste and real danger to the country that has accompanied such feast and famine treatment in the past.

SEN. SYMINGTON: I am going to work as hard as possible to see (1) that we increase our efforts to maintain military superiority over the Communists and (2) that the people are given all truth that will not help a possible enemy.

◈◈◈

G. E. Puts $20 Million on Line in Bid For Turbine and Missile Business



Artist's sketch depicts G.E.'s new supersonic propulsion facility due for completion in early 1958. Areas numbered are: (1) Test cell No. 1; (2) Test chamber; (3) Air heater; (4) Test cell No. 2; (5) Exhaust silencer; (6) Compressor building; (7) Electric substation.

General Electric Co., which has not yet been tapped to produce a guided missile for the military services, is making every effort to get a missile project of its own.

This was disclosed by C. W. LaPierre, G. E. vice president for the Electronic, Atomic & Defense Systems Group. The company for many years worked on the Hermes ground-to-ground missile, but the project was dropped in 1954.

LaPierre told a press conference in Evendale, Ohio, G. E. will move its guided missile headquarters from Schenectady, N. Y., to a site 20 miles northwest of Philadelphia. Missile manufacturing facilities will be built at the new location.

• **J. S. Parker,** general manager of the Aircraft Gas Turbine Div., said G. E. is "definitely interested" in getting into the commercial jet engine market It has high hopes for the J79, selected for such military aircraft as the F-104, the B-58 supersonic bomber, and the F11F-1. He added that G. E. is putting "very substantial emphasis" on small gas turbines like the 1,000-hp T58 which have big possibilities for helicopters, convertiplanes, executive transports and the like.

Parker also announced a substantial increase in G. E.'s commitment to the future of the gas turbine engine. He disclosed the company will spend $20 million of its own funds for a new supersonic engine test facility at Evendale.

• **G. E.'s decision** to spend such a large sum represented a substantial victory for Air Force leaders driving for greater financial contributions from industry in the area of research and development. Gen. Thomas D. White, Vice Chief of Staff, USAF, promptly praised the company's action and urged other U.S. companies to "roll up their sleeves and pitch in even harder to add to governmental sponsored efforts to keep us ahead technologically."

Designed for testing jet engines three times as powerful as any now in production, the G. E. facility "will be the most advanced of its type in the world," according to Parker. "It will be able to simulate the same conditions a large jet engine would encounter flying at 2,300 miles per hour, or three and a half times the speed of sound at 60,000 feet."

To be completed in 1958, the G. E. facility will have two altitude test cells 18 feet in diameter, together with air heaters and compressors, exhaust silencers and an electric power substation to provide the 80,000 kw of electricity the facility will need for operation. Ultimately, G. E. may add an exhausting system to the facility to fully simulate high-altitude operation of jet engines under all possible conditions.

• **As presently planned,** Parker said, the new facility will be of principal value in simulating supersonic jet tur-

G.E. development engineers use this baby jet, run by compressed air and gas, to demonstrate how a turbine engine operates.

Computers May Bring 'Bugless' Jet Engines

The prospect of "bugless" jet engines through the use of electronic computers like the IBM 704 is seen by Dr. H. R. J. Grosch, General Electric computer expert.

"As our experience with these machines grows, and we perfect our techniques of providing the machines with data," he said, "we should be able to make the first actual engines closely approximate what we said the paper engine could do."

Grosch also predicted that the electronic brains may serve to eliminate the possibility of underpowered aircraft, which has plagued the military services in the past.

Use of honeycomb metal fabrication techniques is one approach planned at G.E. toward lightweight components for future engines. Result—lightweight engines with more thrust per pound of installed weight.

bine air inlet temperatures as high as 900°F. "These high air temperatures and high speeds create many mechanical and metallurgical problems for jet engine designers, and this new facility will enable us to solve these problems and so deliver advanced engines on shortened time schedules," he predicted.

G. E. presently has a stake of more than $100 million in company-owned aircraft propulsion facilities—production as well as research and development. LaPierre said the decision to invest an additional $20 million in R&D facilities results primarily from the fact that G. E. will be in a position to exercise greater control over its R&D operations than its production operations, which depend in large measure on military requirements.

Parker urged more generous financial rewards for companies that conduct military-type R&D programs with their own funds or facilities. He said this would encourage companies to press their R&D activities far beyond the point where they normally suspend them and begin looking for a military production contract. He criticized the idea that the payoff for research work should be a production contract, noting that this philosophy frequently causes companies to "taper off" their research work prematurely.

"I think it is very healthy for major industrial concerns to go into really advanced research," he declared. "They bring a practicality to the work you don't find in government or university research." ◈◈◈

Hungarian Air Force Much Larger Than Peace Treaty of 1947 Allows

The development and modernization of the independent Air Force of the Hungarian "People's Army" has been progressively steady since 1951. Its present strength is about six to seven times larger than it was stipulated in the articles of the peace treaty of Paris in 1947.

While the Armed Forces consisting of Army, Danube Flotilla and Air Force totals today 240,000 to 255,000 men—and, therefore, amounts to a quarter of its 1944 greatest war-time strength—the Air Force alone has at its disposal more than 550 aircraft and approaches the war-time strength of the end of 1944 when it had 900 aircraft.

The Hungarian Air Force consists of four fighter wings, three of which have 120 aircraft each and one 50 aircraft. The piston-engine Yak-9 Frank fighters which have been used for years are being replaced extensively by MiG-15 Fagot jets. The Hungarian aircraft industry has started production of Fagots.

• **Six independent groups** of 20 fighter aircraft each have been organized for air defense. In addition, there is an integrated Hungarian - Rumanian - Bulgarian fighter regiment with squadrons stationed in Kecskemet, Hungary; Lugoj, Rumania; and Widin, Bulgaria.

In addition to these units, there is a fighter-bomber wing equipped with the piston-engine Ilyushin I1-10 Beast. Late last year, a squadron of four-engine bombers (presumably Tupolev Tu-4 Bulls) was organized as a training unit. This constitutes a flagrant violation of the peace treaty, since Article 12 expressly forbade bombers and allowed only 90 fighter and transport aircraft as well as 5,000 men. Li-2 Cab (C-47) transports are used.

The Air Force is under the control of the Ministry of Defense, which is headed by a Soviet citizen of Hungarian origin, Istvan Bata. The Air Force is commanded by another Soviet citizen, Lt. Gen. Sandor Hazi, who received his military training in the Soviet Union.

Up to February 1955 the pre-military training of pilots was in the hands of the Hungarian Flyers Associations (MRSZ) which is similar to the Soviet DOSAAF organization. This association was recently merged with the other specialized organizations for the Army, Partisans, and the Danube Flotilla under the title of the Hungarian Voluntary Armed Forces Association (MOHSZ).

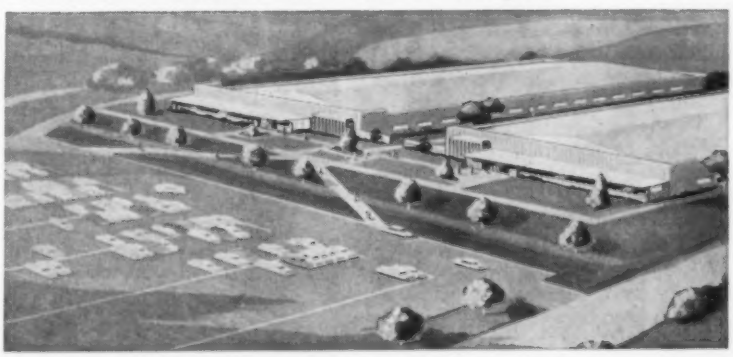
• **During the period** 1948 to 1955 the two Soviet Air Force divisions in Hungary constituted the air defensive and offensive forces in the Danube Valley. Upon the departure of the Soviet Armed Forces units from Austria and the conclusion of the Warsaw Pact, only one of these divisions is to remain in Budapest.

The strengthening and re-equipment of the Hungarian Air Force may result in the departure of this last unit.

Whether because of thorough control of all flights or for other reasons, until now no Hungarian aircraft of the Air Force has flown to the West, although in 1954, a Hungarian MiG-15 was forced to land near Bjelovar in Yugoslavia because of lack of fuel.

Hungary's approximately 600 military aircraft—more than twice the 275 existing in December 1953—bear the Soviet star plus a narrow green circle in order to distinguish their nationality. In the course of "Sovietization," the emblem was changed three times.

Lockheed Missile Lab Takes Shape



First contract awards and construction details for this 102,000 sq. ft. research facility have been announced by Lockheed Missile Systems Division. It will be built on a 22-acre Stanford University site at Palo Alto, Calif. Lockheed is also building a 96,000 sq. ft. missile production facility at Sunnyvale, Calif., about seven miles from the laboratory. Lockheed investment at the two locations will be about $7 million.

Aeroquip's Hurst: Million-$$ Idea Man

German-born engineer who came to U.S. years ago has parlayed $90,000 invested by American businessmen into $25 million annual sales.

Aeroquip Corp. of Jackson, Mich., recorded sales last fiscal year of $25 million and a net profit of $1.4 million —which adds up to a lot of flexible hose lines, couplings and fittings.

That's a pretty good record for a company that was started only 15 years ago by a German immigrant who talked 10 businessmen into investing $90,000 toward an idea.

That's the result. Here's how it happened:

• **Late in August,** 1939 Peter Hurst, a 28-year-old German engineer, came to the U.S. in search of freedom. Only a year before he had been a firmly established engineering executive in his native land—with a great distaste for the Nazi dictatorship.

In Germany, Hurst had been almost spectacularly successful. After working in England for a few years following his graduation from the Institute of Technology at Karlsruhe, he had been asked by officials of Argus Motoren Co. to help set up a new company to produce aircraft wheels and brakes. He was then only 24, but the invitation came because in England he had been associated with W. L. Avery, who had invented the first aircraft wheel with an expander tube brake.

Led Development Engineers

In Berlin, Hurst led a group of engineers in the development of a self-sealing coupling which enabled aircraft wheels to be replaced without the necessity of priming or draining hydraulic brake lines. If he could find the right people in the U.S., he felt that he could put this knowledge and experience to good use.

Hurst found the right people. Not immediately, but after many months of frustrating discouragement. And even then the fact that he was in the U.S. on a visitor's visa prevented him from engaging freely in business activities.

To change his status to that of an immigrant, he had to go to Cuba and then re-enter the U.S. Not until April, 1941, was he able to file his first papers for American citizenship.

• **Today, as president** of the Aeroquip Corp. of Jackson, Mich., he heads one of the world's largest manufacturers of flexible hose lines, couplings and fittings. Net sales for the first quarter of the fiscal year beginning Oct. 1, 1955 totaled $7.2 million, a 46% increase over the corresponding previous quarter. Sales for fiscal 1956 are expected to approach $30 million.

When young Hurst, armed with the proper letters of introduction, arrived in New York on August 25, 1939, he lost no time heading for the Civil

Peter F. Hurst

Aeronautics Authority in Washington. There he was advised to get in touch with Charles Hollerith, vice president of Hayes Industries, Inc. of Jackson, which was then manufacturing wheels and brakes based on Avery's expander tube brake design.

But still the right doors refused to open. In Akron, Ohio, Hurst obtained an appointment with a manufacturer of hose lines and fittings who showed an interest in acquiring a license to make the self-sealing couplings, but considered Hurst's design of the hose and fittings of little value.

The months wore on and Hurst's visa was about to expire. But he determined that somehow he would win the right to stay here and, by one means or another, managed to obtain extensions of his visa. In the meantime he laid plans to organize his own manufacturing company. All he needed was the capital to get started, but that obstacle did not daunt the ambitious young engineer from Germany.

• **One day** he was visited by Hollerith and Don T. McKone, a director and legal counsel for Hayes Industries. They invited him to Jackson to discuss the possibility of a license agreement relating to aircraft wheels and brakes with the Argus Motoren Co.

While the agreement was being concluded, Hurst was discussing his plans to launch a manufacturing venture of his own with some local business leaders and industry executives. He told them frankly that he planned to start making hose fittings and self-sealing couplings somewhere in the New York area once he was able to raise the necessary capital.

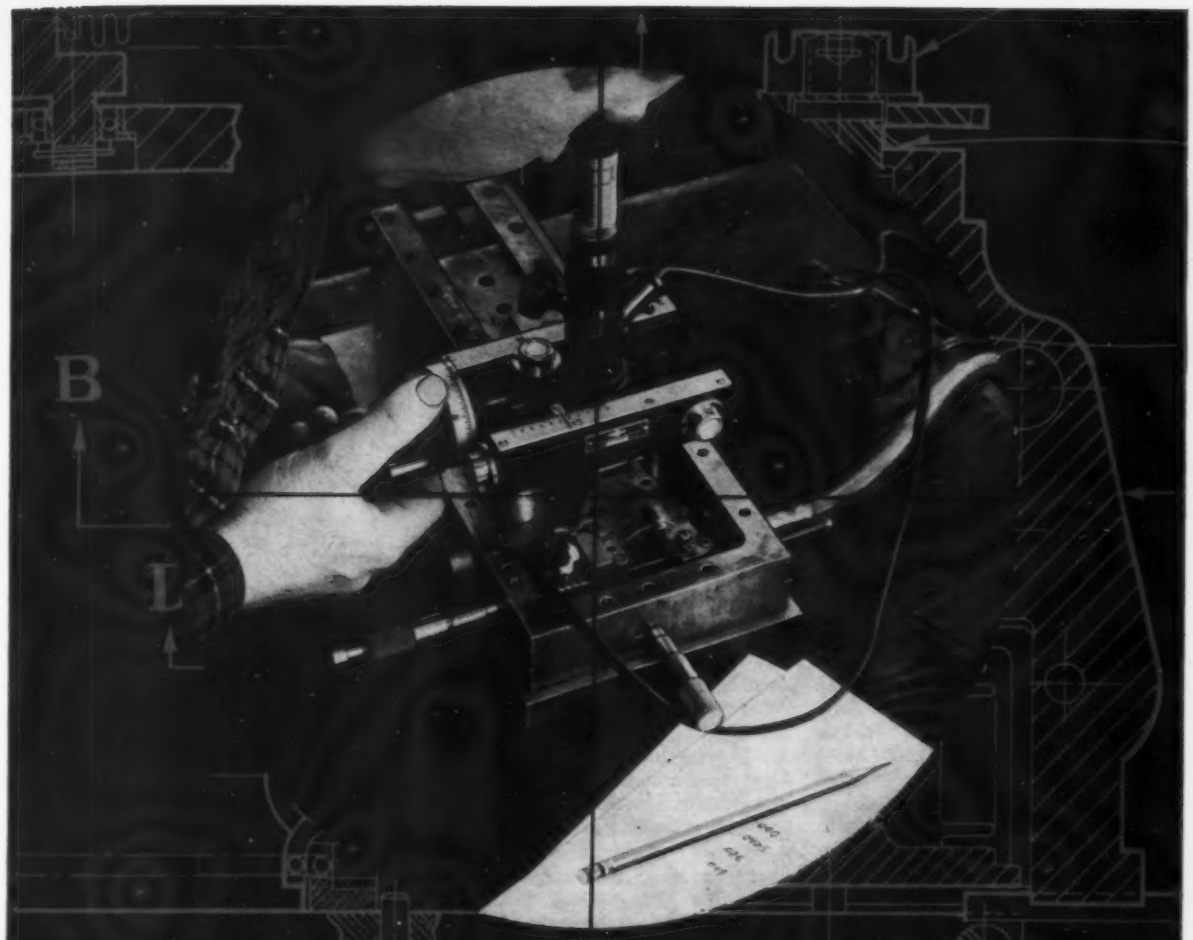
Started in 1940

Hurst's enthusiasm for his project must have been infectious, for within a few days ten Jackson businessmen put up $1,000 apiece to help him change his mind about the locale of his new venture. Thus did Aeroquip Corporation get under way in Jackson on April 26, 1940.

Among the principal stockholders and incorporators were McKone and Hollerith, who were elected president and vice president respectively.

• **That $10,000** got Hurst started, but it took another $80,000 from the same group to keep him going. None

A bank of multiple-spindle screw machines at Aeroquip's main plant in Jackson, Mich.



Little things that make PERFECTION

CECO

America's fighting planes depend on many *little*, extremely precise elements to deliver their k.o. punch. In CECO Turbo-jet Engine Controls, vital mating parts are held to closest tolerances; surfaces are finished to 2-4 micro-inches. Assembled and adjusted with infinite exactitude . . . many of them almost completely under specially designed, large-size, high-power microscopes . . . these mechanisms control fuel flow with the extreme accuracy essential to optimum performance.

Here at CECO are the engineering abilities . . . manufacturing know-how and equipment . . . the attention to little things . . . that bring perfection always closer.

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WEST HARTFORD 1, CONN., U.S.A.

PIONEER PRODUCERS OF
JET ENGINE FUEL CONTROLS • AFTERBURNER CONTROLS
PUMPS • SERVOMECHANISMS • CARBURETORS • PROTEK-PLUGS

Spot-welding department at Marman Products Co., subsidiary of Aeroquip, which was acquired last March. Marman Products produces clamps, couplings and straps.

of the original backers has ever regretted his investment. Some of them are still on the board of directors.

Profits of Aeroquip for the fiscal year ending September 30 were estimated at $1,500,000, or $1.50 a common share. There are more than 3,000 shareholders, but "management and friends" still own 40% of the stock. Last August, Aeroquip stock was placed on the market of the American Stock Exchange in New York.

Today Aeroquip hose, fittings and couplings are used not only on commercial transport planes and military jets, but in the railroad, trucking and construction industries. Flexible hose can often be substituted for steel pipe or metal tubing.

While at first Aeroquip was almost entirely dependent on defense orders, today its business is at least 50% commercial. And Hurst himself, now president of the company, concentrates much of his time and energy on developing the commercial end of the business.

Forced into Manufacturing

• **The original idea** behind Aeroquip was to maintain an engineering staff only and to subcontract production, but this was abandoned as it became difficult to interest subcontractors in the type of work needed. Aeroquip thus was virtually forced into manufacturing itself. In September, 1940, the old Bakelite plant of the Reynolds Spring Co. in Jackson was acquired and the first production machines were installed. On December 31, just two months later, the first shipment of self-sealing couplings were shipped to The Glenn L. Martin Co.

Aeroquip's production facilities soon had to be expanded as more aircraft manufacturers adopted its products. By the time the U.S. entered the war, following the attack on Pearl Harbor by Japan, Aeroquip was well established. But Hurst was still an alien and an alien of an enemy nation, at that. He was forced to sever his connection with Aeroquip.

Despite the suspicions of Army and Navy men concerning Hurst's German background and loyalties, Don McKone and other associates believed in him. Aeroquip's stockholders decided to finance a small non-defense plant for him. The plant reclaimed old bottle caps and tin cans to make new bottle caps.

• **Even during** Hurst's absence, business was good for Aeroquip. Airplanes were being ferried across Alaska to Siberia in increasing numbers and it was learned that many of them could not operate properly in the frigid climates of those countries because hose lines became so brittle at low temperatures they cracked too easily. Certain planes, however, seemed to have no difficulty.

The Army Air Forces discovered that these planes were equipped with Aeroquip hose lines. A directive was issued that only Aeroquip hose could be used on combat aircraft. For a time Aeroquip was the only source of supply of hose lines and fittings for all aircraft manufacturers.

Because such a situation obviously could not be permitted to continue for any great length of time, Aeroquip invited its competitors to take a royalty-free license for the duration of the war. Six companies accepted and were actively aided by Aeroquip in getting into production.

Wastes No Time

• **It was not** until September, 1943 that the Secretary of War and the Secretary of the Navy consented to Hurst's return to the company he had founded. He was immediately installed as executive vice president in charge of operations. One of his first acts was to order signs posted all over the plant saying:

"To Hell With Your Story—We Want Action."

The story is that production was doubled within a year's time.

By the end of the war, however, aircraft production had dropped from 10,000 a month to 2,000 a year and it looked as if Aeroquip would have to cut back. Hurst recommended expansion into other fields, and the directors went along with him.

• **Today Aeroquip** has operating subsidiaries or affiliates in Los Angeles and Burbank, Calif.; Van Wert, Ohio, and Toronto, Canada, and its main plant in Jackson covers two acres. It has total assets of approximately $13.7 million and the initial $10,000 investment of the ten Jackson businessmen is reported to have a market value of more than $15 million.

Last March, as part of the company's expansion and diversification, Aeroquip acquired Marman Products Co., Inc. of Los Angeles at a cost of $1.8 million. Now operated as a wholly-owned subsidiary, Marman is said to be the foremost producer of specialized clamps, couplings and straps in the U.S. Its products are related to, but not in competition with Aeroquip's.

Earlier last year Aeroquip purchased the flexible hose line and self-sealing coupling business of its former Canadian licensee and transferred its operations to a newly formed subsidiary, Aeroquip (Canada) Ltd.

2,608 Stockholders

• **Thus the business venture** that Peter Hurst launched 15 years ago has become an international organization with approximately 2,608 stockholders and 1,372 employees.

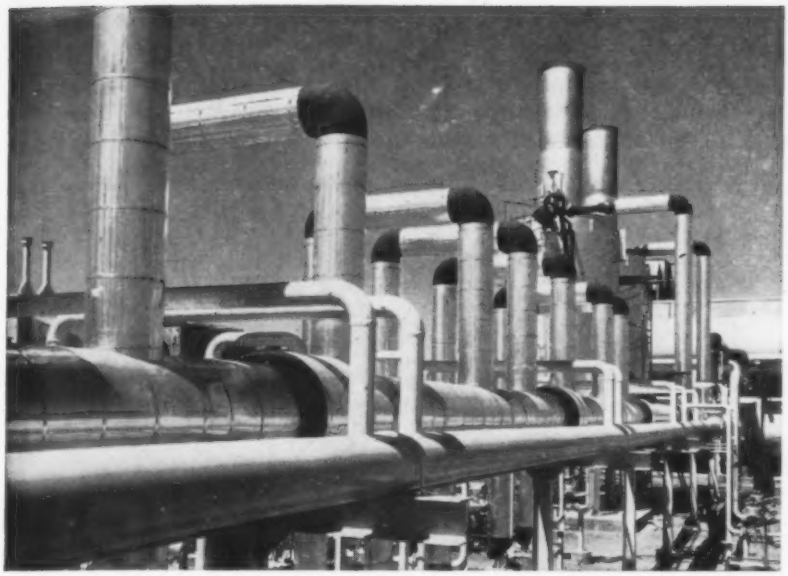
Now 44 years old and an American citizen for more than ten years, Hurst acts and talks like many other U.S. industrialists.

"Opportunities are still abundant in America," he says. "Surely, the confidence is there. . . . we are on the threshold of even more formidable accomplishments. What can be done in the industrial applications of atomic energy staggers the imagination."

In men like Peter Hurst, the imagination is not easily staggered. ◈◈◈

$60-Million Order

A $60-million Navy order for WV-2 early-warning radar Super Constellations has been received by Lockheed Aircraft Corp. The contract, largest ever awarded by the Navy for the plane, will extend output through December, 1957.



Exterior view of AiResearch facility shows hundreds of miles of piping that feed 75 production test cells and stands for aircraft component and system testing.

AF-Leased Plant Gives AiResearch Giant Test Facility for Accessories

By FRED S. HUNTER

Latest addition to the expanding industrialization of one of the nation's great winter playgrounds—the sun country of Arizona—is a $5,000,000 production testing facility for aircraft accessories, located on a 10-acre site adjacent to the Phoenix plant of the AiResearch Manufacturing division of The Garrett Corp.

It is an Air Force facility, leased to AiResearch, and it is described as the largest installation of its kind in the U.S. It also represents one of the largest privately operated sources of compressed air in the world.

Hundreds of miles of piping—to channel off the compressed air at different pressures and temperatures to all parts of the sprawling laboratory—and the other intricate plumbing silhouette the Arizona desert scene in a striking illustration of the complex trail leading to today's new frontiers of speed and altitude.

• **Assembled in the facility** are more than 75 production test cells and test stands for proving aircraft components and complete systems. Unlimited production of air includes 670 lbs. per minute at 300 lbs. per sq. in. heated to 900°F simultaneously with 15 lbs. per minute at 1,000 lbs. per sq. in., heated to 1,000°F. Connected with the vacuum system, altitudes above 75,000 feet can be created. Vacuum pumps are 4,500 times more powerful than a household vacuum sweeper.

Gas turbine engines, air turbines, air turbine starters, pneumatic controls, cabin pressure regulators, hot and cold air valves, refrigeration systems and heat transfer equipment are AiResearch products which can be mass production tested in the elaborate new facility.

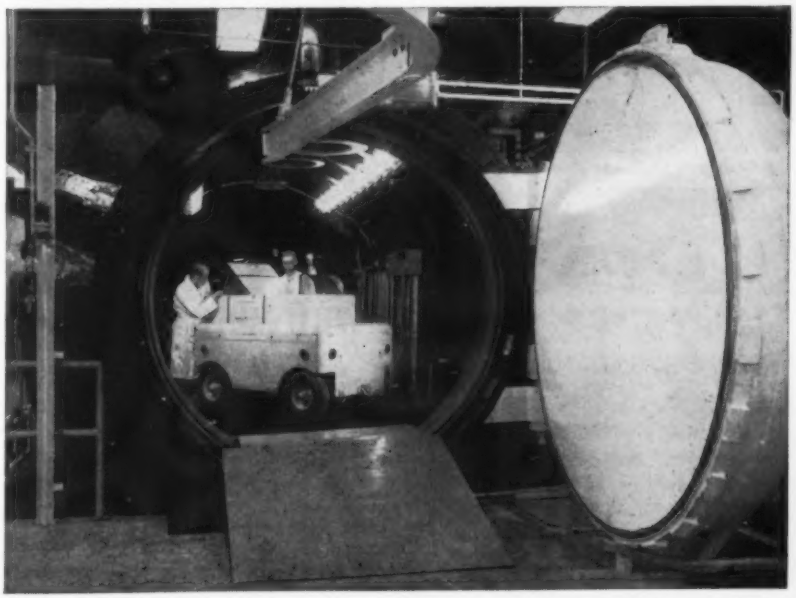
Included in the big test structure, in which the blasts of hundreds of pounds of compressed air creates a constant din, are foot-thick concrete enclosed test cells for sea-level testing of gas turbine engines. Each has its own bank of calibrating instruments which can record as many as 35 variables simultaneously. Pressure, speed, torque, etc. are analyzed as the engines run at speeds close to 45,000 rpm. Similarly, 18 such cells are for testing of air turbine starters, air turbine motors, and air turbine refrigeration units, operated off a source of 300 lbs. per sq. in. at temperatures up to 900°F. Other cells are equipped to handle testing of gas turbine motors.

Four accessory cells are instrumented to test gas turbine controls, accessory cases and heat transfer equipment with an air flow rate of 50 lbs. per minute at 300 psig of ambient temperature. Three cells are equipped to test fuel nozzle patterns, flow quantities and related characteristics.

• **Atmospheric conditions** from more than 1,000 feet below sea level to more than 75,000 feet above sea level may be created in six steel cabin altitude chambers, which are 15 feet long and nine feet in diameter, divided in the middle to create cabin conditions on one side and ambient air conditions in the other half. Nearly 7,000 cu. ft. of air per minute can be moved through each tank in testing cabin pressure regulators and superchargers.

A giant altitude and cold chamber is 15 feet in diameter and 32 feet long. Connected to the vacuum system, it simulates altitudes to 75,000 feet and can go from sea level to 70,000 feet in one minute. Compressed air supplies include pressures up to 300 psi, temperatures from 65° below zero to 500° above, and air flows to 350 lbs. per minute.

There are 12 isobaric test stands



Forty-three-ton altitude chamber, being readied for hot and cold tests of AiResearch starting unit, measures 15 ft. in diameter, 32 ft. long. It creates altitude conditions up to 75,000 feet, simulates diving or climbing conditions.

Capacities of AiResearch's New Test Facility

Low Pressure Air
1,410 lbs. per min. at 135 psi;
525 lbs. per min. at 3.15 psi

High Pressure Air
670 lbs. per min. at 300 psi

High Pressure Hot Air
670 lbs. per min. at 300 psi at 900°F
15 lbs. per min. at 1000 psi at 1000°F

Vacuum
200 lbs. per min. at 75,000 ft. altitude

Refrigeration
100 lbs. per min. continuously at -65°F

Fuel System
Pumps, coolers and heaters for liquids from -80°F to 500°F

which are used to test pneumatic controls for valve systems. A test stand for ram air turbines supplies oil at 3,000 pounds per square inch at a flow rate of 15 gpm for fan operation testing.

• **In a soundproof room,** two dynamometers evaluate speed and torque transmission of gas turbine engines, air turbine starters and other equipment. Coupled electric dynamometers are capable of motoring at 300 hp or absorbing 400 hp. At 6,000 rpm, compressed air is supplied up to 300 psi, temperatures to 900°F and flow rates to 250 lbs. per minute. Other calibrated water-brake-type dynamometers absorb up to 200 hp and are located in the main test cells.

Test equipment necessary to measure temperature, time, speed, stress, strain, vibration, pressure, acceleration and other factors is designed and fabricated in an instrumentation area which includes a machine shop. All test variables are recorded by audio or visual instrumentation and then the data is reduced for engineering diagnosis.

The facility, which has a staff of approximately 300, is operated under the direction of Murray Gelber, vice-president and manager of the AiResearch Arizona division. ◆◆◆

Manufacturing Briefs

• **Beechcraft Research and Development Inc.** is a new wholly-owned subsidiary formed by Beech Aircraft Corp. to conduct secret missile research and other advanced research projects. Directors are the same as those of the parent company. Indications are that the subsidiary will take over Beech's research facility at Boulder, Colo. Research and development of such items as missiles "is now such an important factor to the future security of our country that Beech Aircraft considers this new expansion program a most worthwhile investment," Mrs. O. A. Beech, president, said.

• **Flight tests** of the second Martin XP6M-1 jet flying boat will be delayed until test equipment similar to that lost in crash of the first model is installed. Second plane was equipped with mine-laying and navigation systems planned for the production version, but these will be removed to make room for the test equipment. Cause of the crash of the first plane hasn't been determined.

• **Approval** of a $5.5-million bond issue to improve Long Beach Municipal Airport assures that final assembly of the Douglas DC-8 jet transport will be at Douglas-Long Beach. Funds will pay for lengthening 6,900-ft. runway to 10,000 ft.

• **The Glenn L. Martin Co.** received USAF okay to proceed with construction of a guided missile research plant near Denver, Colo. Martin is expected to use the facilities to develop, test and produce a second intercontinental ballistic missile for USAF. Contract to build first ICBM is held by Convair and Ramo-Wooldridge Corp.

• **North American Aviation Inc.** said that out of $521,288,484 worth of goods and services it bought in its 1955 fiscal year, 52.9% came from small business concerns employing fewer than 500 workers. Purchases were distributed among 12,500 suppliers, of which 90% qualified as small concerns, NAA said.

Computers Make Automation More Flexible

New technological advances are adapted to job-lot assembly of electronic components and production of machine tools.

By HENRY P. STEIER

Despite the growing reputation of automation as a mass-production technology, it offers big advantages for job-lot production. Two new areas in which automation is receiving considerable attention are the assembly of electronic components and parts production on machine tools.

Job-lot production or assembly obviously present different economic problems than mass-production. Through the use of computers and computer technology, automation methods are being applied to achieve the flexibility that permits rapid set-up changes. This is of major importance to big producers as well as small ones.

The new emphasis on automation to meet job-lot production demands is in line with the testimony of Dr. Allen V. Astin, director of the National Bureau of Stands, before a Congressional Subcommittee on Economic Stabilization last year.

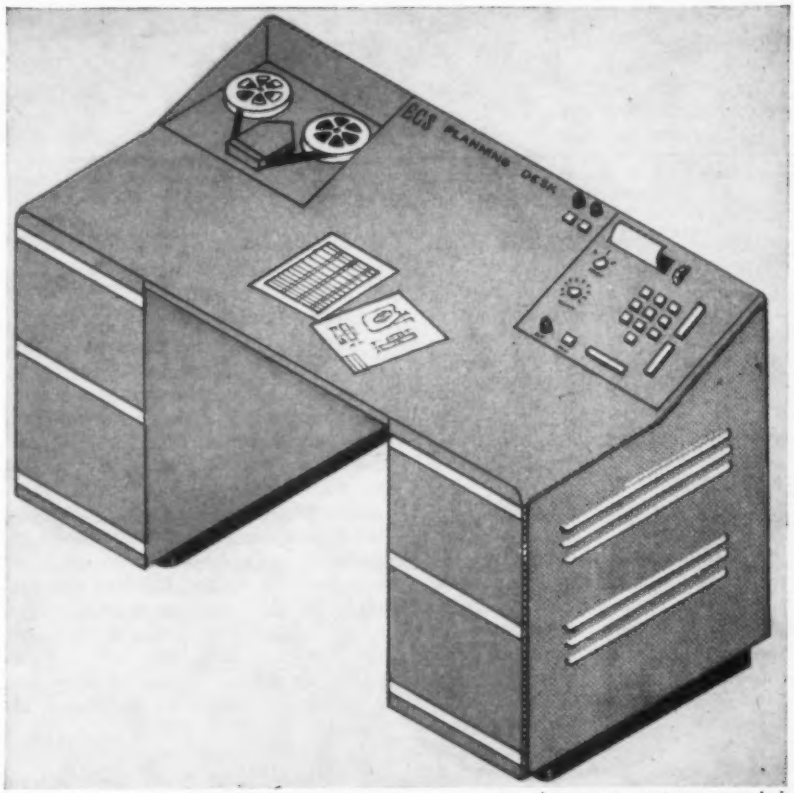
• **Said Dr. Astin:** "Automation is not new. It is the natural outgrowth of scientific research and development in the field of mechanization. It is new only in the sense that recent advances in the field of electronics and communication can now be applied to automation."

When he said that "automation is not new" Dr. Astin was undoubtedly thinking of the types of automation found in the conveyor belt, the automatic screw machine, stylus-tracer-controlled milling machines and other mechanized operations that have been in use for some time in mass production. But the trend today is toward developing electronic computer technology for automation to adapt it for job-lot production.

Several companies have revealed approaches to the automatization of work that back up Astin's firm reasoning that "it is to the computer as a flexible control mechanism that we must look for future developments" in automation.

Machine Tool Automation

Stromberg-Carlson, division General Dynamics Corp., has recently developed a new technique for the automatic control of machine tools. The technique brings into play a little of the advanced thinking of Astin's reasoning about the application of "the decision and judgment capabilities that are characteristic of computer technology."



The planning desk containing a special purpose computer that prepares tape recorded instructions for automatic control of machine tools.

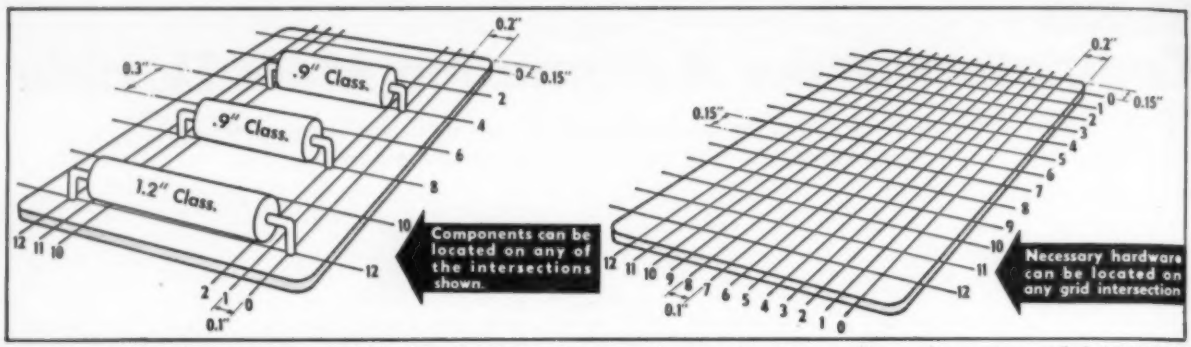
Electronic Control Systems, Inc., an affiliate of Stromberg, has designed a system that controls machine tools from magnetic tapes. Following the desires of potential users as expressed in a national survey, ECS has devised a small, special purpose computer that prepares taped instructions for such machines as lathes, milling machines, grinders and gear cutters.

Despite the great number of automatic machine tools available, many users would like to operate without the help of mathematicians and large computers. Many operators wanted to use their non-computer trained staff to prepare jobs. Also, the need was great for a system that permitted maximum utilization of a machinist's time, rapid production changes and rapid switch-over to different jobs.

• **The ECS system** uses a special-purpose computer installed in a planning desk. An operator at the desk inserts information taken from blueprints and methods sheets into the computer. This is done by push-buttons and knobs. The information is resolved into signals by the computer and is recorded on a magnetic tape. By placing the tape in a playback unit that feeds information to the machine tool under control, automatic production of the work is accomplished.

From a drawing of the piece, for example the methods man determines the location, from a fixed reference point "X", "Y" or "Z", of the beginning and end of each cut. He also determines the speed of table travel. When information about these points is determined, feed selectors on the planning desk are adjusted and a button is pressed. The tape recorder then records information generated by a computer and stops as soon as the recording is complete for a given desired path of cut. For circular or other shaped paths the same process applies, until the recording is finished.

• **After recording,** the tape is removed from the desk, and may be placed in a playback unit. When the tape is played signals go to a control box on the machine tool in question and automatically guide it to cut



Component and hardware locations on Melpar's wafer design for use with the automatic assembly machine system called Mini-Mech. System is believed to have special advantages for micro-miniature assemblies expected to be developed.

straight lines, circles, parabolas, or other compound curves as instructed by the tape.

With the ECS system, one man can tend a number of machines, and aside from set-up, loading and unloading, he does not have to operate the machine. Semi-skilled labor may be used for many operations.

Tapes may be stored. Lead time for new items is reduced because less training, written information, tools, etc. are needed.

Electronic Assembly

In the field of electronic assembly mass production, General Mills Inc., mechanical division and United Shoe Machinery Inc., have reported on applications of their machines. International Business Machines Corp., the first to buy the "Autofab" machine produced by General Mills, is using the machine at its Kingston, N. Y. plant for producing assemblies for air defense computers of the Semi-Automatic Ground environment (SAGE) system. At this time IBM plans to produce more than 800 different assembly combinations on the Autofab, and will apply components to both sides of a printed wiring board. No other machine applications were announced.

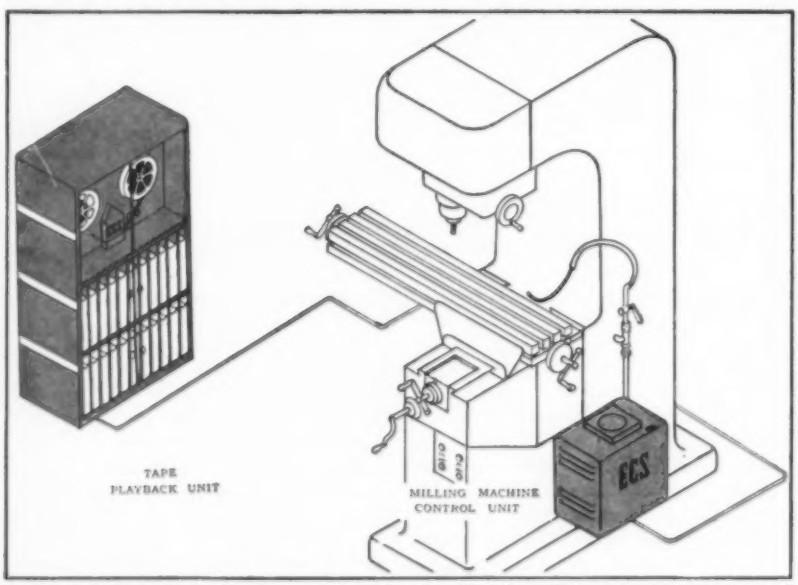
United Shoe says 18 of its "Dynasert" assembly lines are operating in industry. New machines in use will handle many sizes of components based on dimensional standards of the Radio-Electronics-Television Manufacturers Association.

Emphasizing the very short run techniques that are being developed for electronic assembly of components, a development by Melpar, Inc. uses punched cards for guiding an assembly machine called "Mini-Mech." Under development for Bureau of Ships, the cards are prepared at a desk console and inserted into a system that guides the Mini-Mech assembler.

Mini-Mech was designed to produce assemblies in very small quantities of 10 to 20 units. The printed wiring boards used are small wafers measuring 1.6 by 2.1 inches. Unlike other systems, boards are not transferred to different insert positions for different components. The boards are moved in 0.6-inch increments, corresponding to the grid layout system used, and after each move another component is inserted, irrespective of its size. The insertion tool is automatically adjusted to receive different size components.

• **Another feature** of Mini-Mech is the provision of solder-plated printed wiring boards. After the components are inserted, a heated anvil causes solder to flow around crimped leads. Melpar feels the new system will have definite advantages when the "micro-miniature era" arrives. The wafers are designed so that they may be mounted one on top of the other, and in this way they achieve the "third dimensional" idea that is characteristic of Project Tinkertoy modules.

The Automatic Component Assembly System (ACAS) developed by the General Electric Co. for the Signal Corps has now been moved from its "test bed" at GE's Advanced Development Laboratory in Ithaca, N. Y. It is soon expected to undergo trial runs at GE's military equipment plant in Utica, N. Y. Designed for limited production runs, this machine falls into a class of production volume somewhere between such machines as Autofab and Mini-Mech.



Tape playback and machine control units for the Stromberg-Carlson-sponsored system of automated machine-tool operation using information from the tape.

RCA Active in Automation

• **Radio Corporation of America** has been active in automation on an "exploratory" basis. It has made an extensive study of automation as it relates to what it calls "systems." Broken down, RCA "systems" are: integrated data processing, product design, methods and processing, equipment design and experimental production.

These are all being investigated as they relate to mechanized production. A full-fledged result of RCA's work on data processing is evident in its "BIZMAC" machine recently delivered to the U.S. Army Ordnance Tank-Automotive Command. This $4-million machine converts months of paperwork into minutes of pushbutton operation.

It keeps track of replacement parts for combat and transport vehicles at depots throughout the world.

In product design, RCA is investigating various grid layout systems and component configurations, such as a tube socket that plugs in at right angles to a printed wiring board. In methods and processing, and machine design, equipment has been built for component preparation, assembly, soldering, automatic testing, material handling, etc. A small test factory has been built for tests with 85 different printed wiring board configurations.

Says RCA: "We are learning to use the machines, but RCA does not have a pushbutton factory."

Excepting for such machines as Autofab and Dynasert, the whole approach to automation of electronic assembly is in a "cautious" state. In all reporting on developments there is a naturally strong emphasis on the economic factors, especially as to where the "break-even" point occurs on the load curve of production volume versus time. This factor is so intimately tied in with each producer's operating philosophy and economic status that it remains a dominating factor in the long haul ahead before machines are available to satisfy needs of even rough divisions of producer categories. ◆◆◆

Norden-Ketay Synchros Guide 'Muscles' For Missiles, Navaids, Bomb Directors

It's a long way from 1918 "U-boats" to today's Nike missiles, but the names of Norden and Ketay are strong links in engineering achievements that connect the two periods.

The names are now joined to form the Norden-Ketay Corp. This is an era of rapid-fire mergers and extensive products "mixes" in the electrical and electronic industries. Norden-Ketay is a member of those dynamic and fast changing industries, but its product mix is unlike any other company's.

In the short space of little more than a year since the names joined in February 1955, the corporation has developed into a seven-division, three-subsidiary organization.

President of Norden-Ketay is Morris Ketay, an engineer whose passion for precision, miniaturization and automation is reflected in the activities of the companies over which he presides. A backlog of $20 million in business, which represents a gain of 100 percent in six months, testifies to the growth prospects.

• **Ketay was** with the old Charles Cory Corp. on New York's Varick Street back in the late '20's. It was then that Ketay's interest in precision synchros developed and Cory merged with what is now the Bendix Aviation Corp.

Oddly enough, these now widely-used accurate synchro devices that transmit mechanical commands over electrical circuits were on board a German U-boat interned in Baltimore harbor in 1916.

Synchros were first produced by the Siemens Halske company of Germany in the late 19th century. It was not until 1924 that the synchros were taken out of the sub by the U.S. government for study. Ketay was given the job of analyzing the devices, and calls it his "most important engineering job."

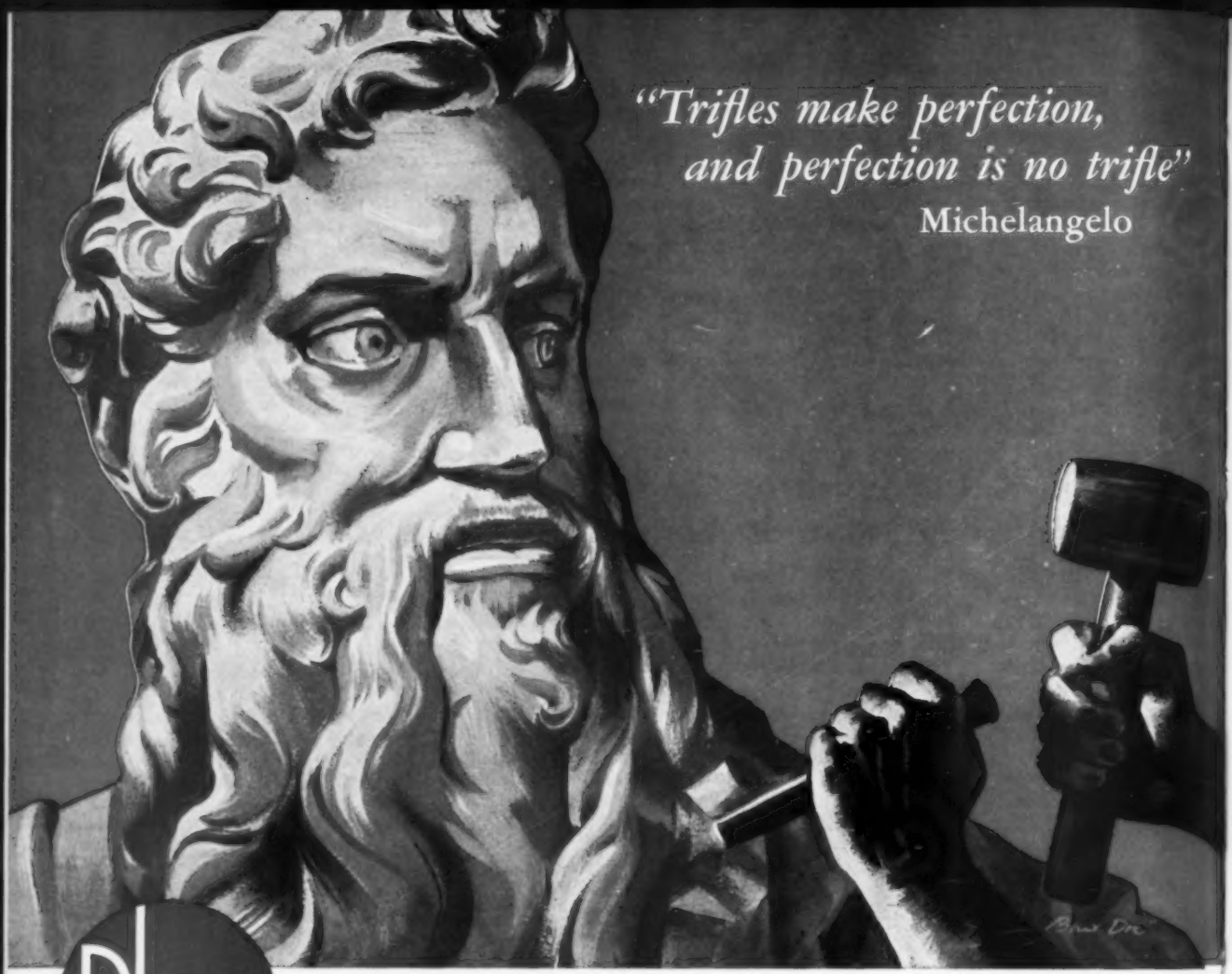
• **Foreseeing the importance of** synchros to the future, Ketay was influential in 1934 in having Bendix develop a series of units of small size. In 1934, when the Boeing B-17 was being developed, a big snag in the operation of this first four-engined monoplane bomber was the time it took to replace the engines. In those days the capillary tube and similar mechanical connectors were used to transmit engine data to the plane's cockpit instruments. It was a mean job to "lace" this stuff through the wing structure and took lots of time.

The Boeing people suddenly remembered the synchros Bendix had been trying to sell, and which had received much attention at the Paris International Exposition of 1937. Ketay proposed a plug-in system to adapt the instruments to synchro control and was given six months to develop a tachometer, fuel flow, thermometer and oil pressure system for synchro transmission.

At the same time he had to put alternating current in the aircraft to operate the synchros. This startled everyone, but they bought the idea.

"From then on," he says, "it was a sleigh ride." Today some aircraft use up to 300 synchros. The copyrighted name "Autosyn" was coined by Ketay while he was with Bendix. The B-17 became the first aircraft to use synchros in quantity.

• **In the middle '40s,** when Bendix began to pitch its activities toward commercial products, Ketay went into business and organized the Ketay Manufacturing Co. Later in the '40s, when Bell Telephone Laboratories received a contract for Nike missile development, it needed synchros and resolvers (computing elements) meeting new standards of accuracy. Ketay worked with Bell on synchro component designs that were finally adopted and are used today in



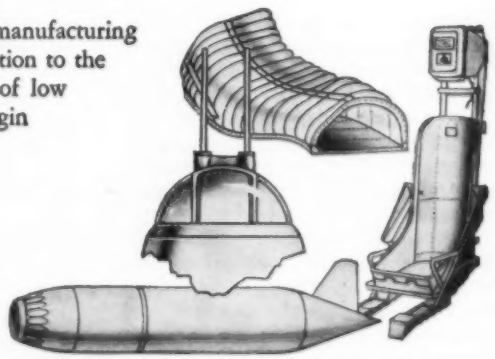
Rheem

GOVERNMENT PRODUCTS DIVISION

Michelangelo was a great perfectionist. He knew that where perfection is desired, attention to minute details is indispensable.

The people at Rheem know this too. For in every phase of Rheem manufacturing ... from drawing board to finished product ... perfection, by attention to the smallest detail, is the goal. Now add to this an enviable record of low per-unit cost, and on-time completion schedules, and you will begin to understand why the name *Rheem* has become a symbol of both quality and dependability.

Rheem's Government Products Division is presently in quality development and production on air frames, missile and jet engine components, airborne ordnance, electronics and ordnance materiel.



YOU CAN RELY ON RHEEM

Rheem Manufacturing Company • GOVERNMENT PRODUCTS DIVISION

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Nike missiles. They are still being supplied by Norden-Ketay.

Today, these synchro devices generate the delicate commands that operate the servo "muscles" used in guided missiles, aircraft navigation and control, computers, bomb directors and production automation.

The Norden story is, of course, that of bombsight fame, and started back in 1928 with the invention by Carl L. Norden of new fire control and synchronizing bombsight machines. The strategic value of bombing missions carried out with the Norden sight was well-proved in the history of World War II. The key value of the "little black box" was evident in the way each Norden sight was checked in and out for each mission.

• **Today advanced bomb director** systems are being developed by Norden-Ketay using Norden principles and Ketay controls. Still basically optical devices, as were the early instruments, today they are also electronic and permit bombing through an overcast. They also function as combined airborne search and navigation systems.

While the early Norden Bombsight was claimed to have "pickle barrel" accuracy, it needed a pretty big pickle barrel. Today both getting the weapon to its objective and then placing it are functions of the weapons system. Norden-Ketay's engineers prefer to call their ultra-reliable bombing developments "weapons delivery systems." The systems rely heavily upon the start-to-finish navigational aspects of the job.

Norden-Ketay Corp. is getting lined-up as a heavy contender in the field of inertial guidance and navigation, either missile-borne or aircraft-borne. A look at the organization's growth picture shows purposeful expansion directed to the kind of know-how strength that matches trends in the evolution of air combat, air transport and industrial operations.

• **The Precision Components Division** makes rotating servomechanism components, tachometers, rate generators, synchro resolvers and places emphasis on miniaturization and precision. These devices are important in inertial system work and in industrial automation.

The Instrument and System Division makes air-data computing systems and indicating instruments. Such devices are especially important to the jet aircraft planned for commercial transport, and perhaps to inertial systems. They will become more important as jet operations increase. The Norden Laboratories Division has research facilities and precision know-how along optical, electrical and mechanical lines. Acquired on Feb. 6, 1956, the Gyromechanisms Divi-

sion will supply facilities for work on gyros and related mechanisms. To bolster production facilities for making precision gears, Norden-Ketay has a division named the Frohman Manufacturing Co., Inc.

• **Despite current problems** with accuracy in inertial systems, there are authorities who believe "absolute" precision ultimately can be achieved without recourse to external reference through such means as Doppler radar, now being worked on as a means of periodically correcting such systems. However, the first system will probably be an intermediate one requiring electronic know-how. Norden-Ketay has a division in the electronics field, Boston Electronics Corp. that has been active in the electronic countermeasures and related fields. A subsidiary, Vari-Ohm Corp. makes precision potentiometers that are important devices in computers for guidance or industrial automation.

Dr. Louis Ten Eyck Thompson, director of research for Norden-Ketay, a member of the board of directors, and formerly vice chairman of the Defense Departments' Research and Development Board, believes that in looking ten years ahead "it is not enough to be technically clever." He says "You must 'fit' systems to the industrial operations environment of the projected period or types of battles to be fought." For that reason, an appreciable part of Norden-Ketay's R&D work is in intensive exploratory studies of trends in the evolution of combat and industrial operations.

• **Thompson emphasizes** the importance of developing Norden-Ketay's capability to effect smooth transition throughout the cycle extending from first explorations into and through final development, design and first quantity production. He calls this "transition engineering."

To accomplish this, he has been instrumental in choosing an operating program including all phases of the laboratory and production cycle. Economy of total effort and shortened time schedules to achieve successful new system production is the goal of his program.

In essence, the program calls for abolition of the practice of dropping the work in the next group's lap as systems develop through steps of research, development, design, production engineering and first production. The organizational plans call for close coupling and close collaboration between all these groups at all stages of the work.

• **There are three other** organizations with Norden-Ketay. Rounding out the corporations broad coverage of scientific fields, is a subsidiary, Nuclear Science and Engineering Corp., the only supplier of radio-active isotopes other than the Atomic Energy Commission. Chairman of Nuclear Science is Gordon Dean, former chairman of the AEC.

Norden-Ketay has an interest in Ketay Limited, an English company, jointly owned with The Plessy Company Limited. Synchros made in England are referred to as "Ketays." An organization on the West Coast called the Western Division handles business activities in that area. ◈ ◈ ◈

Transistor Technology Steps Ahead

Transistor technology has taken a large step forward with Bell Telephone Laboratories' application of a recently developed fabricating technique to this type of semi-conductor.

Bell has successfully applied the diffusion process, used in treating silicon in the Bell solar battery, to transistors. The result is a break through the wall that hampered transistor operation much above 100 megacycles or in wide-band communications networks.

Experimental model of Bell's new high-frequency transistor.

Diffusion is a process by which minute amounts of impurities are introduced in controlled amounts into a material. The three-layer chemical "sandwich" of a transistor contains a center layer known as the "base." The thinner the base layer the higher the frequency at which the transistor will operate. The diffusion process provides a high degree of control over this base layer dimension.

The way is now open for transistor use in wide-band systems since the new units have a gain of 100 to 1 over a band 20 megacycles wide, and will operate up to 600 megacycles as the frequency cut-off point.

Guided missiles and electronic computers for military use are expected to find great advantages in the new transistor's possibilities, and development is now under way preliminary to regular production of the new units.

ENGINEERING

AF Develops Low-Level Ejection Seat

Pilot (dummy) and seat are ejected from F-94 while still on runway.

Seat and dummy separate immediately.

Air Force Wright Air Development Center has developed a low-level ejection seat escape system capable of parachuting a pilot to safety from an airplane on the runway, WADC officials have disclosed.

Actually, the system is not designed for ground ejection, but for escape at very low altitudes such as during takeoff, approach or low-level flight.

In one test conducted by WADC at Wright-Patterson AFB, a dummy the size and weight of a man was ejected from the rear seat of a Lockheed F-94 while still on the runway. These experiments showed that the parachute system could permit a satisfactory vertical descent.

Test data placed the speed of the F-94 at 146 knots (about 170 mph) at time of ejection. Height reached by the dummy was approximately 45 feet.

The dummy was separated from the seat immediately after ejection and the parachute opened automatically two seconds later.

Even more satisfactory results can be obtained by using a higher velocity of ejection and quicker separation from the seat, says WADC aircraft laboratory engineer Marvin Whitney. In the F-94 tests the dummy was ejected at a velocity of 60 feet per second. Better results are anticipated by raising this velocity to 80 fps.

• **Later tests** have also shown improved results by timing the seat separation so that it occurs one second after ejection and the chute opening a second later. Current operational escape systems use a two-second delay between ejection and seat separation and another two seconds before the chute opens.

WADC also found that raising the nose of the aircraft just before ejection improves the pilot's chances of escape. Although results vary with flight speed, by pitching the nose up as little as six degrees above level flight, the chute will open fully as much as 100 feet above the altitude of ejection.

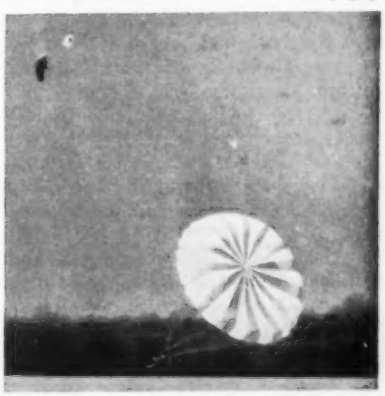
WADC plans no additional ejections from the runway because the seat cannot be recovered in a condition suitable for further testing. But a study of ejections in the 300- to 500-ft. range have shown that a man could be ejected on the runway and survive.

AF officials explain that they are not too concerned with on-the-runway escape systems because runway barriers are capable of saving both the plane and pilot. Also, the "danger area" for most operation planes from the standpoint of successful escape appears to be from 300 to 1,000 feet.

• **A. B. Nutt,** chief of the special projects branch in WADC's aircraft lab, says that from 1949 through December 1955 approximately 700 operational escapes were made from USAF aircraft. Of these, slightly less than one in every five resulted in a fatality and a disproportionate number of these (about 75%) were due to ejections at altitudes below 2,000 feet. ◈◈◈

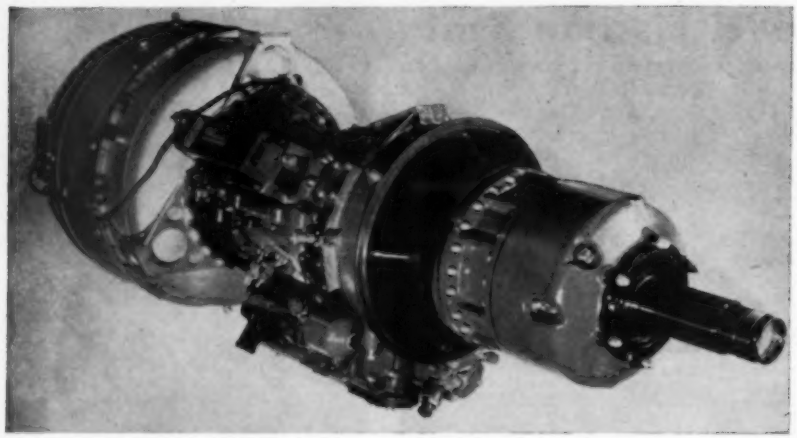
Two seconds later, pilot chute opens.

Dummy starts descent, seat chute opens.



Dummy lands "safely" on airport.

Lycoming Unveils XT53, First U.S. Free Turbine



Prospective customers for future helicopter and turboprop aircraft powerplants got their first look at a U.S.-designed free turbine engine this week as Lycoming Division of Avco Manufacturing Corp. took the wraps off its XT53.

The XT53, a joint Air Force-Army sponsored development, is slated to power the Bell XH-40 helicopter. Engineered at Lycoming's Stratford, Conn. plant, it is the only turbine in the 770-to-825 shaft horsepower class for turboprop use.

Basic design of the XT53 consists of a combination axial-centrifugal compressor, an external annular vaporizing combustor, a single-stage compressor-driving turbine, and a single stage free-power turbine. (The free-power turbine principle is one in which the power turbine, shafting and reduction gearing is mechanically independent of the compressor and its turbine.)

• In the XT53, this arrangement provides an integral torque conversion system in which the output torque increases with a decrease in output speed at constant power. As a result, output shaft power can be held virtually constant over a wide range of shaft speed, both above and below the optimum.

Alternatively, power may vary while shaft speed is held constant.

Emphasis throughout XT53 development, Lycoming officials say, has been in four directions:

• Low fuel consumption—Specific fuel consumption for the XT53's 825-hp military rating is 0.71 pounds per horsepower per hour. For the 770-hp normal rated or maximum continuous power, SFC is 0.72.

• Minimum size/weight—Lycoming turbine weighs 460 pounds, has a diameter of 23 inches and a length of 47.6 inches.

• Maximum utility—XT53 is designed to operate on a wide variety of fuels extending from automotive and aviation gasoline to JP-4 jet fuel. Company officials see potential use in fixed-wing aircraft, boats, heavy ground vehicles and for emergency stationary power generators.

Initially, XT53 production is allocated to military use. However, Lycoming is now exploring these commercial applications to provide a basis for production planning.

XT53 IN BRIEF

• Type—Free turbine with axial-centrifugal compressor.
• Commercial Designation—LTC 1B-1.
• Military Rating—825 shaft horsepower.
• Normal Rating/Maximum Continuous—770 hp.
• Weight—460 pounds.
• Diameter—23 inches.
• Length—47.6 inches.
• Fuel Consumption (at 825 hp)—0.72 lbs./hp/hr. (at 770 hp)—0.71 lbs./hp/hr.
Shaft Speed—6,600 rpm (approx.)
With auxiliary gearbox.
• Weight—549 pounds.
• Length—64.5 inches.
• Shaft Speed—1,750 rpm (approx.)

• Installation flexibility—Although designed primarily for helicopters calling for a high optimum shaft speed, XT53 can be adapted to installations requiring lower speeds. Lycoming has developed an auxiliary gear box which bolts directly to the front of the basic helicopter engine which will reduce optimum output speed from about 6,600 rpm to 1,750 rpm.

With this addition, weight of the engine increases to 549 pounds and overall length to 64.5 inches. Considering the integral torque converter this then, in effect, becomes a "double gearbox" configuration, a feature which Lycoming feels is not the best arrangement.

To compensate for this shortcoming, Lycoming expects to produce an XT53 using a single reduction gear for lower shaft speeds. However, the company says, emphasis in this direction hinges on evidence of sufficient industry interest and demand. ◆◆◆

Who's Behind the XT53

Directing Lycoming's XT53 development is its v.p.-turbine engineering, Austrian-born Dr. Anselm Franz. In Germany, Dr. Franz developed the Jumo-004, first jet engine to be mass-produced and used in combat in World War II.

ODM Approves Formation Of Standardization Group

An Army request for permission to form an integration committee on Army aircraft and maintenance was recently approved by the Office of Defense Mobilization under terms of the Defense Production Act.

Primary purpose of such a committee is "to effect standardization of tools and equipment required in the maintenance of Army aircraft and to bring about the simplification of aircraft designs for ease of maintenance operations and reduction in tool and equipment requirements."

Participating manufacturers are granted immunity from antitrust suits, under terms of the law, as long as participation is "within the limits set forth in the voluntary plan."

Ten companies have accepted invitations to participate. They are: Beech, Cessna, De Havilland of Canada, Doman, Fairchild, Hiller, Kaman, McDonnell, Piasecki and Sikorsky.

CAA Engineers Face Record Number of Projects

CAA Aircraft Engineering Division, already strapped by a shortage of some 20 engineers, now lists an all-time high number of major certification projects.

Current docket of active projects lists seven U.S. transports and 18 foreign, nearly a 3-to-1 margin in overseas activity.

U.S. aircraft in some stage of approval are the Boeing 707 and DC-8 jets, Lockheed Electra and 1649, Convair 440, Cessna 620 and Frye F-1.

Foreign project list includes: Morane-Saulnier MS 760, Fokker F-27, Breguet Deux Ponts, De Havilland Heron, Handley Page Herald 200, Aviation Traders Accountant, Sncase Djinn (helicopter). Sncase Caravelle and Alouette II (helicopter), Hurel-Dubois HD-32, Prestwick Twin-Pioneer, Percival P-9, Vickers 810 and 840 Viscounts and the Vickers 900 Vanguard.

RADIO BEARING INDICATOR | OMNI-MAG | RADIO MAGNETIC INDICATOR | DISTANCE INDICATOR

Bendix "EYES" MAKE TACAN "EASY READING" FOR PILOTS

Across the cruel, treacherous waste land that makes up the bulk of the Alaskan territory, a group of crack U. S. Air Force pilots do daily patrol safeguarding America's first line of defense. Cursed with prolonged periods of darkness, vast unidentifiable areas of ice and snow, treacherous changes in weather, and the absence of ample emergency bases, they have a rough assignment. But their missions are being accomplished with the surety and accuracy of a trolley riding its track—and TACAN is the reason why.

Developed by IT&T's Federal Telecommunication Laboratories and manufactured by Federal Telephone & Radio Company, TACAN installations now provide super-accurate radio highways that crisscross the territory. And computing indicators developed by Eclipse-Pioneer convert TACAN's UHF impulses into distance and direction that let the pilot "see" his progress along these invisible highways. They're designed to work with conventional navigation instruments, too, so that a pilot needs no special training before flying the TACAN system.

Making critical data "easy reading" for pilots has been our business since 1919. For specialized or conventional instrument requirements, write today to ECLIPSE-PIONEER DIVISION, BENDIX AVIATION CORPORATION, TETERBORO, NEW JERSEY.

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Let "by Bendix" be your guide to *BUY BENDIX*

Attention Engineers: Opportunities are now available for men with EE, ME and AE degrees in the design and development of automatic flight systems. Send resumé today to Mr. C. S. Cleveland, Coordinator of Technical Placement.

Eclipse-Pioneer DIVISION

Bendix AVIATION CORPORATION

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LEAR PRODUCES

This roster of Lear aviation products is, of necessity, incomplete. Many of these products are frequently combined to form an infinite variety of additional products or systems. Only enough typical devices are shown here to demonstrate Lear's mastery of a field of science and technology that uses thousands of such building blocks for meeting the highly specialized requirements of modern aircraft and missiles.

δ *flight control systems*

Automatic altitude controllers
Automatic approach couplers
Automatic Mach number controllers
Automatic pilots (lightplane)
Automatic pilots (high-performance)
Automatic pitch, yaw, and roll dampers
Automatic rudder controllers
Automatic wing flap systems
Missile control systems
Test equipment

σ *flight reference systems*

No-gimbal-lock vertical gyro indicators
Stable platforms
Test equipment
Three-axis gyro indicators
Vertical gyro indicators

γ *navigational systems*

Automatic radio direction finders
Glide slope receivers
High-latitude gyro compass systems
Integrated ADF-magnetic compass systems
Localizer receivers
Marker beacon receivers
VHF Omnirange receivers

ξ *electro-mechanical systems*

Artificial feel systems
Camera positioners
Canopy control systems
Carburetor air door controllers
Convertiplane rotor positioning systems
Cowl flap positioners
De-icing valve positioners
Engine throttle controllers
Gas, hydraulic, fuel, valve positioners
Inlet screen retraction systems
Inlet vane angle controllers
Jettison systems
Landing gear lock systems
Mechanical advantage ratio changers
Oil cooler flap controllers
Parachute door systems
Precision remote positioning systems
Supercharger blower shifters
Test equipment
Throttle friction controllers
Trim tab positioners
Turbo-prop clutch valve controllers
Wing flap positioning systems

λ *electro-mechanical components*

Linear actuators
Rotary actuators
Servo actuators
Power units
Actuator controls
Alternators
Capstans
Freewheeling clutches
Friction clutches
Magnetic clutches
Slip overload clutches
Electromagnetic brakes
Flex drive u's, hex's, L's, and T's
Flexible shafts
Gearboxes
Handcranks
Motors (AC and DC)
Enclosed fan motors
Explosion proof motors
Gearhead motors
High frequency motors
High temperature motors
Miniature motors
Pneumatic motors
Servo motors
Torque motors
Screwjacks
Load limit switches
Position limit switches
Programming switches

ζ *instruments*

ADF indicators
Attitude indicators, 2-axis
Attitude indicators, 3-axis
Directional indicators
ILS indicators
Integrated ADF-magnetic indicators
Trim indicators
Tuning meters
Omnirange indicators

μ *instrument components*

Altitude transducers
Vacuum tube amplifiers
Magnetic amplifiers
Printed and etched circuit amplifiers
Transistor amplifiers
Displacement gyros

for the precision needs of aviation

Dynamic pressure transducers
Gravity-sensing switches
Magnetic modulators
Magnetic powder clutches
AC and DC servo motors
Electric gyro motors
Flag motors
High-frequency motors
Torque motors
Power converters
Rate generators
Rate gyros
Resolvers
Synchros
Synchro repeaters

ψ *communications systems*

UHF, VHF, HF, MF, and LF receivers
VHF transceivers
VHF, HF, and MF transmitters
ADF receivers
Airport traffic transceivers
Monitoring transceivers
Portable transceivers
Telemetering receivers
Test equipment

ε *communications components*

Audio frequency amplifiers
Vacuum tube amplifiers
Magnetic amplifiers
Power amplifiers
Printed and etched circuit amplifiers
Transistor amplifiers
Aircraft broadband antennas
Ground plane antennas
LF-MF whip antennas
Loop antennas
Mobile antennas
Trailing wire antennas
UHF-VHF whip antennas
VHF Omnirange antennas
Antenna fairleads
Antenna reels
Antenna tuning coils
Cable assemblies
Coil assemblies
Crystals
Dynamotors
Headsets
Loudspeakers
Amplifying loudspeakers
Noise-cancelling microphones
Radio noise filters

ϕ *test equipment*

Bench test cable assemblies
Electronic test sets
Field strength meters
Pressurizing test kits
Universal electro-mechanical test stands
Universal motor test stands

η *fluid handling equipment*

Absolute pressure switches
Bombsight and instrument desiccators
Canopy seal pressurizing kits
Cooling units for electronic assemblies
Dehydrators
Fuel flow dividers
Pneumatic actuators
Pressurizing control panels
Alcohol pumps
Anti-detonant injection pumps
Ballast pumps
Bilge and refueling pumps
Dry air pumps
Electric motor driven pumps
Ethylene glycol and coolant pumps
Ethylene oxide pumps
Fuel pumps
Fuel booster pumps
Fuel filter de-icer pumps
Fuel transfer pumps
Hand operated pumps
Heater fuel pumps
Hydraulic pumps
Hydraulic oil booster pumps
Hydrogen peroxide pumps
Lube oil and scavenge pumps
Multiple-element pumps
Oil transfer pumps
Scavenge pumps
Smoke pumps
Submerged fuel booster pumps
Vacuum pumps
Water pumps
Radar pressurizing kits
Rocket engine fueling nozzles
Air relief valves
Check valves
Hydraulic valves
Hydraulic servo valves
Isobaric relief valves
Pressure regulating valves
Vacuum valves

π *miscellaneous*

Airborne television installations
Airplane brake modernization kits
Auxiliary power supplies
Electronic chassis assemblies
Executive airplanes
Periscope prism selectors
Precision remote positioners
Printed circuits
Radomes
Wire harnesses

LEAR Lear

CP-13

• LearCal Division : Santa Monica, Calif. • Lear-Romec Division : Elyria, Ohio • Aircraft Engineering Division : Santa Monica, Calif. • Lear International, Inc.: N.Y.C.

Problem: in an aircraft emergency, how to evacuate the plane in 90 seconds or less — the estimated time that occupants are physically capable and the crew able to lead the escape.

For AIR CRUISERS, construction of an escape slide to meet this exacting need became an impressive challenge involving eleven major design objectives.

Recent Air Force tests show how capably the challenge was met. "Inflatable Escape Slide — Type 10" promises to be another major achievement in a field in which AIR CRUISERS has won first place: *aircraft survival equipment for the airlines and Armed Services.*

AIR CRUISERS, the only manufacturer which conducts continuous research in survival equipment, is America's most experienced fabricator of inflatable rubber and rubberized materials.

Contributing to this specialized science is another division of The Garrett Corporation — AiResearch. From AiResearch laboratories and engineering come integrated components for automatic inflations which are the world's most advanced in design and quality... sharing in the progress toward "Survival Unlimited!"

THE GARRETT CORPORATION

AIR CRUISERS DIVISION

BELMAR, NEW JERSEY

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ESSO AVIATION TURBO OIL 35

ONLY OIL APPROVED FOR LUBRICATING VICKERS VISCOUNT TURBO-PROP ENGINES

An exclusive Esso achievement... Esso Aviation Turbo Oil 35, a synthetic product, is the *only* gas turbine lubricating oil approved by Rolls-Royce, makers of the four "Dart" turbo-prop engines powering the Viscount "700" Series.

Only a *synthetic* lubricating oil can meet all the exacting requirements of these turbine engines; they cannot be met completely by a mineral oil, even of the highest quality.

This is another Esso "first," result of technical *research* and *foresight* on the part of Esso aviation lubrication specialists working in close cooperation with British and U. S. aircraft engine designers and builders.

Esso Aviation Turbo Oil 35 used by the following Viscount operators: British European Airways • Air France • Aer Lingus • Trans-Australia Airlines • Trans-Canada Air Lines • Capital Airlines • British West Indian Airways • Linea Aeropostal Venezolana • Hunting Clan Air Transport Ltd. • Canadian Department of Transport • Butler Air Transport Ltd. • Braathens S.A.F.E. • Misrair S.A.E. • Indian Air Force • Iraqi Airways • Middle East Airlines • Central African Airways

Esso

INTERNATIONAL AVIATION PETROLEUM SERVICE

JET FLIGHT IS SAFER

because pilots and crews are

LINK TRAINED

Every time a U. S. jet pilot streaks through the blue, he proves anew the value of "Link" training. The skill and sureness with which he handles his highly complex machine were developed during countless hours of "flying" a Link jet flight simulator on the ground.

Link jet flight trainers, produced by the company that pioneered the field of flight simulation, teach instant, almost instinctive reactions . . . a *must* for the pilots and crews of high-speed, jet aircraft, both military and commercial. Emergency procedures, hazardous to duplicate aloft, can be, and are, taught over and over in Link simulators. This means better pilots, and, in turn, increased safety for crews and passengers.

Link leads the world in the field of jet training, with more than 800 jet flight simulators in active service . . . a record not even approached by any other manufacturer. The latest Link jet flight simulators are highly refined, complex devices utilizing electronic, electrical and mechanical components as best suited to a particular function. Each is designed to conform in every important respect to the flight characteristics and cockpit layout of an actual jet plane. They represent the cheapest, safest and most efficient way to obtain jet flight proficiency—for captain and crew alike.

Link leads the world, too, in the computer systems which animate every existing flight simulator. Link alone has delivered flight simulators incorporating DC electronic computer systems . . . systems which mean improved dynamic performance of the simulator, better built-in checking devices, fewer maintenance problems and simpler, less costly circuitry. A unique feature of the DC computer system—exclusive to Link—is the *linear interpolator*, which adapts the simulator to new engines via simple manual adjustments.

Among Link's newer flight simulators, which have already saved millions of dollars and thousands of man-hours during their operational history, are these units, for current Air Force and Navy aircraft:

- *Douglas F3D all-weather jet fighter*
- *Boeing B-47 six-jet bomber*
- *Lockheed F-80 jet fighter*
- *Convair F-102 supersonic jet all-weather fighter*
- *Northrop F-89D twin jet all-weather interceptor*
- *McDonnell F2H-3 twin jet fighter*
- *Cessna T-37A jet trainer.*

Now approaching the delivery stage are the following simulators—the newest additions to our air defenses:

- *Douglas F5D supersonic jet shipboard interceptor*
- *Grumman F11F-1 supersonic jet fighter*
- *Chance-Vought F8U supersonic jet fighter*

With new turboprop and jet simulators on the way, Link leads the world in flight training equipment for the jet age.

The pilots who command the new jet and turboprop transports will, as in the past, be *Link trained*.

LINK AVIATION, INC.

LINK AVIATION, INC., BINGHAMTON, N. Y.

PIONEER AND WORLD'S LARGEST PRODUCER OF JET FLIGHT SIMULATORS

A subsidiary of General Precision Equipment Corp.

Circle No. 16 on Reader Service Card.

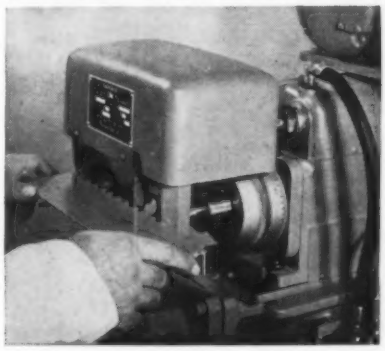
New Products and Processes

HIGH-SPEED DRILLING MACHINE

A versatile, high-speed, semi-automatic drilling machine that has many applications in the aircraft, automotive and other industries has been announced by the **Fairchild Aircraft Division** of the Fairchild Engine and Airplane Corp.

Trade-named the Speedy Driller, this new lightweight, portable machine is being made by Fairchild's Speed Control Division in St. Augustine, Fla. It was developed by Everett E. Jones of the Aircraft Division's tool engineering staff.

Fairchild has been using an experimental model of the machine in its Hagerstown, Md., plant for some time. It has been employed for drilling the attaching holes in sheet metal parts that have flanges, such as wing ribs, fuselage frames and longerons. Production models of the machine weigh approximately 365 lbs.



According to the manufacturer, the driller is designed basically to utilize the proper feeds and speeds in drilling through material and to cut the long time lapse between drilling operations. Tests are said to indicate that it substantially reduces handling time, human error and operator fatigue.

Circle No. 149 on Reader Service Card.

OVERHEAT WARNING SWITCH

A bearing overheat detector thermostat developed by **Vapor Heating Corp.** will detect a bearing overheat temperature of 275°F and light a warning signal in the cockpit in less than four seconds from the time the condition occurs, according to the manufacturer.

Designated Vapor thermal switch 3162, this miniature control weighs .065 lb. It meets Air Force military specifications Mil-S-25345 and Mil-E-5272A.

No amplifier, relays or bridge pick-up are necessary in using the control, which is supplied with thermostats of any temperature setting up to 550°F. It may be used to sense overheat conditions in motor bearings, gear boxes, universal joints, clutches, electrical generator or alternators on commercial and military aircraft.

Circle No. 150 on Reader Service Card.

VHF-FM AIRCRAFT RADIO

The Communications Co., Inc. has announced the availability of a two-way VHF-FM airborne voice communications unit for use in connection with industrial operations that maintain their own mobile radio systems.

The Comco Model 400-12/24 unit is supplied for 25-54 mc, 72-76 mc or 144-174 mc bands. Total weight of the system is 22 lbs. Provision is made for operation from a 12- or 24-volt power supply system. The radio frequency power output is 25 watts in the 25-54 mc band, 20 watts in 72-76 mc band, and 15 watts in 152-174 mc band. A whip type of antenna is used for all bands, although a "T" or "L" type may be used on some aircraft.

Circle No. 158 on Reader Service Card.

RAYDIST PLOTTER

A new Raydist dynamic phasemeter and a new Raydist plotter, small and light enough for installation in a pilot's compartment to give continuous flight position data, have been developed by the Hastings Instrument Co.

The phasemeter (upper left in photo) is said to have many advantages over the previous unit made by the company. Accuracy is reported to be three times that of the previous unit. The manufacturer says the new phasemeter should be vastly superior under thunderstorm conditions. It weighs 8 lbs., less than half the weight of the older unit, and requires approximately 25% less space.

The new Raydist plotter, designed primarily for aircraft, enables the pilot to see his position plotted directly on a chart. The plotter and the phasemeter are said to be the first in a series of new equipments planned by the company, which recently had some patent litigation settled in its favor.

Circle No. 156 on Reader Service Card.

AXIAL BLOWER

The Type AXB2249 axial blower now offered by **John Oster Mfg. Co.,** Avionic Div. puts out 25-30 cu. ft. of air per minute at zero static pressure. The unit weighs 8 oz. and is 3.375" long by 2.87" in diameter. The blower housing is made of black anodized aluminum. Either a 115-volt 400-cycle or 27-volt dc motor is available. Used for cooling electronic equipment, the unit will operate from —55°C to +71°C.

Circle No. 155 on Reader Service Card.

POWER RECTIFIER

Rapid Electric Co. has developed a regulated 14/28-volt 200/100-ampere dc power rectifier, designed to meet MIL-P-8194 and MIL-P-6457A.

Operating on 220/440 volts, three-phase, 50-60 cycles, the output voltage regulation is held within .5 volt, including a variation of ± 10% of the rated input voltage.

The rectifier is suitable for aircraft engine starting, electrical system ground checks and dc circuit control systems.

Circle No. 166 on Reader Service Card.

THERMAL TIME-DELAY RELAY

A thermal time-delay relay, Type TDRH, has been developed by **Branson Corp.** It contains two thermal relays which may be completely independent or interwired in various ways to provide special voltage-compensated delays as well as other unique results.

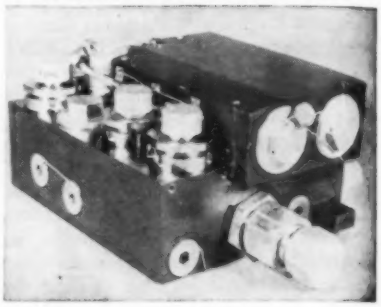
Hermetically sealed, the unit can be operated in ambient temperatures from

NEW PRODUCTS

—65°C to 125°C. According to the manufacturer, it will operate properly under the various shock and vibration requirements encountered in high-speed military aircraft.

Circle No. 148 on Reader Service Card.

SOLENOID SELECTOR VALVE



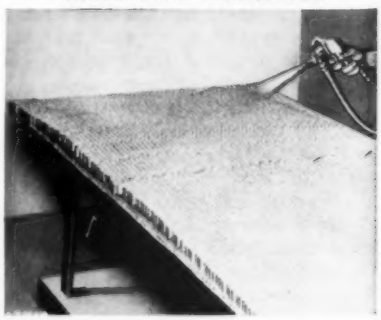
Vickers Inc. offers a new line of constant gain solenoid selector valves for aircraft hydraulic systems, featuring a "packaged" design of seven units in one. They are designed for systems using an on-off type servo-mechanism control.

Basically a four-way, closed center selector valve, the unit contains a single housing restrictor and by-pass valve arrangement, a pressure relief valve, two thermal relief valves, a pressure switch, an electrical solenoid-operated shut-off valve and a check valve.

Design is intended for high-pressure, high-temperature installations requiring two-way actuation of controls at two different rates of response. The valves are recommended for operating pressures up to 4,500 psi, ambient temperatures up to 350°F and return temperatures up to 400°F.

Circle No. 167 on Reader Service Card.

RESIN-TYPE ADHESIVES



Adhesives & Coatings Division, **Minnesota Mining & Manufacturing Co.**, has introduced two new resin-type thermosetting adhesives for "honeycomb sandwich" construction, such as bonding phenolic impregnated kraft paper honeycomb to thin aluminum, stainless steel or magnesium sheeting.

The new adhesives are designated

Along the important new Delta route to New York—linking the Caribbean area and the fast-growing South and South West with metropolitan Northeast . . . to points East, West, North and South . . . Delta Air Lines' fleet will fly with Collins Weather Radar.

Delta Air Lines CHOOSES Collins WEATHER Radar

To select smooth, direct flight paths avoiding storm areas, Delta Air Lines' DC-7's, DC-6's and Super Convairs will be equipped with Collins Weather Radar. Installation of Collins Radar is part of Delta's overall equipment and route expansion program. The Delta fleet will be completely equipped with Collins navigation and communication equipment, including Collins newly designed Selcal (Selective Calling System) and ADF (Automatic Direction Finder).

Collins **CREATIVE LEADERSHIP IN ELECTRONICS**

COLLINS RADIO COMPANY, CEDAR RAPIDS, IOWA, WASHINGTON, NEW YORK, DALLAS, BURBANK,
COLLINS RADIO CO. OF CANADA, LTD., OTTAWA; COLLINS RADIO CO. OF ENGLAND, LONDON

COLLINS

Circle No. 18 on Reader Service Card.

NEW PRODUCTS

EC-1177 and EC-1415. EC-1177 is transparent, has a heavy syrup consistency, weighs about 7.7 lbs. per gal. and is diluted with an equal volume of acetone for spraying. EC-1415 has a transparent amber color and a medium syrup consistency. It weighs about 7.4 lbs. per gal. and can be sprayed as received.

Circle No. 162 on Reader Service Card.

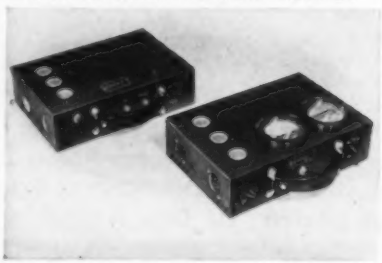
POWER TRANSFORMER

Power transformers have been added to the line of electric accessories for aircraft and missiles made by **Jack & Heintz, Inc.** First unit in the line is the Wye-to-Delta GC150 for conversion of three-phase ac power from 200 volts, line-to-line, to 115 volts, line-to-line. It is being used on the Boeing B-47 and the MD-3 ground power supply unit.

Designed to meet MIL-T-9219, the transformer is constructed to withstand extremes of humidity, fungus, corrosion and vibration, it is housed in an aluminum case. The unit weighs 6.5 lbs.

Circle No. 168 on Reader Service Card.

INSTRUMENT-POWER SUPPLY



Avien, Inc. offers a portable 400-cycle power supply designed for field testing and servicing aircraft instrument systems, small enough to carry in a brief case. The unit weighs less than 7 lbs., measures 12 x 8 x 3½ in.

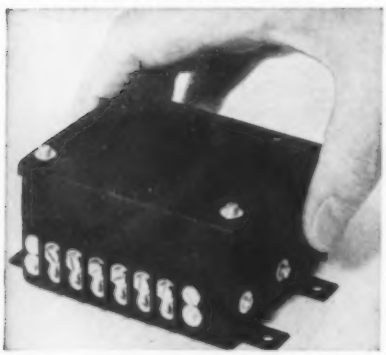
Operating from a 115-volt, 60-cycle line, the unit features continuous variable voltage output from 90 to 125 volts,

NEW PRODUCTS

as required for testing to military specifications. Output frequencies of 360, 400 and 440 cycles are selected by means of a three-position switch. There is a vernier control for fine frequency adjustment.

Circle No. 165 on Reader Service Card.

OVERVOLTAGE RELAY



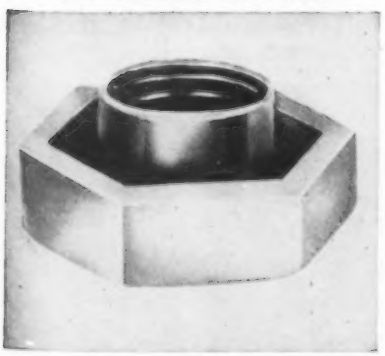
Westinghouse Electric Corp. has developed a new overvoltage relay for aircraft ac electric systems that provides voltage sensing and inverse time-delay characteristics with miniature static components.

The only moving part of the relay is the armature of the shock-proof slave relay used to control external devices such as circuit-breakers or field relays.

Miniature silicon diodes and transistors mounted on a printed circuit are used. The unit is said to maintain accurate calibration from —65°F to 250°F and operation is not affected by vibration, shock or mounting position. It measures 2 x 3½ x 4 in., weighs 13 oz. and operates on ½ watt.

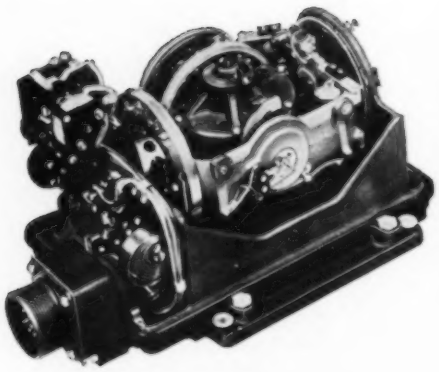
Circle No. 164 on Reader Service Card.

SELF-LOCKING HEX NUT



New series of self-locking hex nuts made by **The Kaynar Co.** has won Air Force and Navy approval. Known as the H10 series, they come in thread sizes 4-40, 6-32, 10-32, ¼"-28 and $\frac{5}{16}$"-24.

These hex nuts contain the same integral locking device common to all Kaylock nuts, in which the upper



This is Honeywell's highly regarded Cageable Vertical Gyro. It has the fastest caging action available—10 seconds maximum; it uncages in three seconds. Ideal as a vertical reference, it is used in radar stabilization, fire control, bombing, navigation, and flight control systems. More than 15,000 of these Cageable Vertical Gyros have been delivered to the Navy and Air Force.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL

threaded portion is deformed elliptically to produce self-locking action. They are said to weigh less than half as much as conventional self-locking nuts and to offer considerable advantage when used in aircraft and guided missile components.

Weight savings of more than 100 lbs. per plane are not uncommon with these nuts, according to the manufacturer.

Circle No. 163 on Reader Service Card.

VIBRATION MOUNTS

K. W. Johnson & Co. is producing metal mounts that use a double damping system in which a circular coil spring tempers the motion of a convex-concave spring. The manufacturer says they provide damping efficiency to 95%.

Used for isolating electronic units from vibration and shock, the mounts are rated as having a natural frequency of 10 cps and can take 30 g's of 11-millisecond duration without separation of the elements in the mount.

A beryllium copper wire cloth is used to form the arresting system, and a stainless steel coil spring fits around the two beryllium copper dishes that form the system. Weight of the mounts is 3½ oz.

Circle No. 160 on Reader Service Card.

ANTENNA DUPLEXER

Microphase Corp. is making an antenna duplexer that permits operation of UHF communications equipment and Tacan equipment on a common broad-band antenna. The device

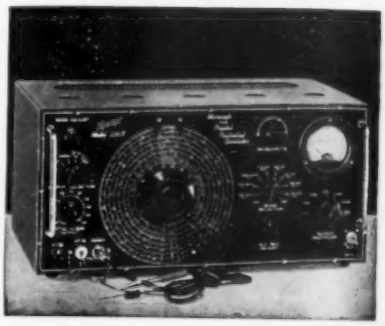
NEW PRODUCTS

is said to meet requirements of MIL-T-5422C.

Insertion loss in either operating band, 225-400 mc and 950-1250 mc, is rated at less than 0.5 db. Standing wave ratio is less than 1.5:1. Isolation between channels is 60 db or more. The unit can handle up to 2,000 watts peak power.

Circle No. 161 on Reader Service Card.

ALL-BAND GENERATOR



The Hickok Electrical Instrument Co. is making a microvolt and crystal-controlled generator designed primarily to service aircraft and mobile receivers.

Designated Model 295X, the generator is said to be able to determine sensitivity, selectivity and frequency with extreme accuracy and without use of correction factors or reference tables.

The equipment combines features generally available only in two separate generators. Technical literature is available.

Circle No. 152 on Reader Service Card.

RADIO PAGER

A pocket size radio paging receiver that calls personnel selectively has been announced by **Motorola Communications and Electronics Corp.** For use with a central system located in a manufacturing plant or business office, the system permits equipped personnel to be called and to hear a voice message from the caller.

The portable receiver weighs 10 ounces and is transistorized. Battery life is about 40 weeks, and up to several

MORE "BARK" THAN "BITE"

in this front . . .

with RCA's new WEATHER RADAR in your plane!

When the weather ahead looks like this, the old rule book says "go around!" But not when you have RCA's AVQ-10 Weather Radar in the business aircraft you are operating. Its scope will point out to you, night or day, or in IFR conditions, non-turbulent paths through or between storm areas that may save time-wasting, costly detours and give you and your traveling companions a smoother, more comfortable ride.

In addition to giving you this "look-see" into the weather as far as 150 miles ahead, the AVQ-10 provides detailed ground-mapping information. It is the first weather radar to use the "C-Band" (5.6 cm) frequency, ideal for storm detection and penetration. Because of its lightness, efficiency and dependability, the AVQ-10 has been specified as standard equipment by many of the world's leading air lines and by operators of business aircraft.

for further information, contact

RCA
RADIO CORPORATION of AMERICA
WESTERN OPERATIONS
AVIATION SALES
11819 West Olympic Boulevard Los Angeles, California

NEW PRODUCTS

hundred persons per system can be paged individually. No FCC license is required. The system operates similarly to the QUIK-CALL selective calling system made by Motorola for use in calling specific aircraft in flight.

Circle No. 159 on Reader Service Card.

AIRCRAFT RIVETER

Manco Manufacturing Co. has developed a hydraulic riveter that is capable of riveting varying thicknesses of metals without time-consuming adjustments of the power stroke.

In the Manco system the ram develops pressure as it meets resistance until it develops the maximum thrust of 12 tons. Cycling is completely automatic. An air-to-oil booster powers the unit, developing its maximum thrust at 80 lbs. air pressure. The present unit, used in aircraft structural work, has a reach of 48 in., but can be designed to accommodate other requirements.

Circle No. 153 on Reader Service Card.

TRANSISTOR TESTER

A pocket-sized transistor tester has been announced by the **General Electric Co.** The unit has plug-in sockets for transistors to be tested. Short circuits, opens, leakage and current gain may be tested. To simplify use, the tester has two scales. One is used to indicate by green, yellow and red scale areas the relative leakage in a transistor. The other scale checks current gain.

Circle No. 157 on Reader Service Card.

DUAL LAMP INDICATOR

Eldema Corp. offers a miniature indicator light that contains two independently wired bulbs and thus can indicate four different conditions.

Model 1F is 1.8 in. long and mounts in a .75-in. diameter hole in panels up to 3/16 in. thick. The replaceable plug-in bulb assembly contains two neon or incandescent bulbs and is available in amber, red, blue, green or clear.

This dual lamp indicator is used in aircraft control systems and instruments.

Circle No. 151 on Reader Service Card.

RUBBER FUEL TANK

A rubber tank shaped like a watermelon that can be rolled over ground, floated in water or dropped without bursting has been developed by the Aviation Products Division of the **Goodyear Tire & Rubber Co.**

Trade-named the Rolli-Tanker, the unit is actually an unconventionally shaped tire of nylon cord and tread stock construction with fuel-proof inner lining. Available in several sizes, the tanks are mounted on hubs and axles to permit easy handling. They may be towed manually or by vehicle.

To date Goodyear has tested 3½ x 5-ft. tanks weighing 40 lbs. when loaded to 250-gal. capacity.

Circle No. 154 on Reader Service Card.

MINIATURE CABLES

Hitemp Wires, Inc. has developed a line of miniature multi-conductor cables for weight- and space-saving purposes. Shielded and jacketed, the cables are available in single conductor constructions up to 24-conductor assemblies.

Each conductor conforms to Mil. Spec. W-16878 for Type E and EE, and can be obtained in solid colors or spiral-striped color codings. Outer jackets may be of Teflon, Kel-F or a glass-fiber braid.

Circle No. 146 on Reader Service Card.

MORE WORKING space and greatly increased production facilities will permit Resistoflex to meet the overwhelming demand for Fluoroflex®-T hose.

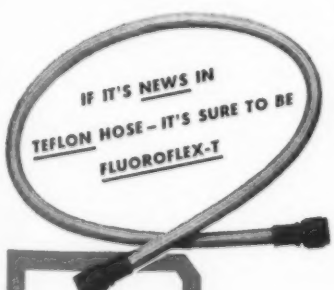
Fluoroflex-T hose and assemblies, *approved by the Services and CAA*, are being specified for more and more engines, airframes and missiles. This new plant, now ready, will produce ever increasing quantities of this finest of aircraft hoses—*the original Teflon hose.*

Proved quality, *proved* service life—that's Fluoroflex-T hose. Send for Bulletin FH-2.

Resistoflex also produces Teflon Military Standard spiral back-up rings and Kel-F® electrical sleeving for aircraft use.

RESISTOFLEX CORPORATION, Roseland, New Jersey; Western Plant: Burbank, Calif.

® TEFLON: DuPont trade mark for its tetrafluoroethylene resin. FLUOROFLEX: Resistoflex trademark for products from fluorocarbon resins. KEL-F: M. W. Kellogg trademark.



20th year of service to industry

Resistoflex

World's fastest, smoothest, most luxurious airliners, the new Lockheed Electras with Allison Prop-Jet power will enter service on Eastern Air Lines routes in the Fall of 1958

Capt. Eddie Rickenbacker
Chairman of the Board
EASTERN AIR LINES

Captain Eddie Rickenbacker chooses

Aeroproducts Propellers *for* Eastern Air Lines'

new fleet of Lockheed Prop-Jet Electras

A balance between engine and propeller is necessary for efficient aircraft performance. It is absolutely essential in the new high-powered Prop-Jet airliners whose propeller tips will spin at velocities of 600 feet per second.

That is why Captain Eddie Rickenbacker, dean of the air transportation industry, has chosen Aeroproducts Propellers with Allison turbine engines for Eastern Air Lines' great new fleet of 40 Lockheed Electras.

This proved engine and propeller team, designed and built by General Motors, will enable Eastern's new 66-passenger radar-equipped luxury liners to fly at speeds of over 400 miles an hour—bringing unprecedented new standards of smoothness and comfort to air travel.

The 4-bladed Aeroproducts Propeller was selected because it utilizes most efficiently the vast power of the Allison turbine engine, and because it combines rugged yet lightweight strength with unique features of pitch control and dependability unmatched by any other propeller.

Eastern Air Lines, serving more United States cities than any other airline, has earned and held the confidence of the traveling public for over 28 years. We of Aeroproducts are highly gratified by Eastern's choice and consider it an outstanding endorsement for Aeroproducts Propellers in this new era of turbine air travel.

The Allison Prop-Jet engine with Aeroproducts Propeller is the world's most advanced propeller-type aircraft power — both certificated by the Civil Aeronautics Administration for commercial service.

Building for Today... Designing for Tomorrow

Aeroproducts

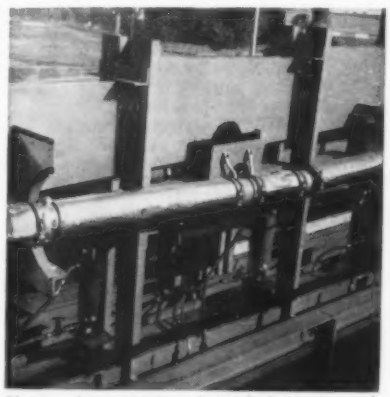
ALLISON DIVISION OF GENERAL MOTORS • DAYTON, OHIO

Douglas Rig Proves Out C-133 Hot Air Ducts

Douglas Aircraft's Long Beach Division has come up with something new in test stands to simulate the most severe flying conditions in checking out hot air ducts for its big C-133 turboprop transports.

These ducts must circulate air that is heated between 400 and 500°F under pressures ranging from 120 to 150 psi.

The test rig, measuring 100 ft. long



Closeup shows section of 100-ft.-long rig used at Douglas-Long Beach for testing C-133 hot air ducts. Hydraulic cylinders control "flex-beam" to simulate flight conditions.

and 12 ft. wide, simulates the structure in the duct areas inside the wing and fuselage down to the attach brackets and supports for the ducts.

By use of hydraulic cylinders, the stand is capable of segmented movement to a predetermined and calculated curve called a "limit curve." This produces a bending axis in the test rig that is in the same plane as the true wing.

Although strains are all pre-calculated in the design stage, the actual testing of this flex-beam gives Douglas another safety step to prove the product prior to flight.

Solar Increases Utility Of Machine Tool Bits

Solar Aircraft Co. is netting a 150% increase in utilization of tool bits by adoption of a new Carmet CA-610 "throwaway" tool blank in machining of jet parts.

According to its producer, Carmet Division of Allegheny Ludlum Steel Corp., previous experience at Solar showed a carbide tip could be used on only 28 jet parts. With CA-610, a new cutting grade, it is now machining up to 80 pieces before replacement.

As an added saving, machine downtime has been cut seven percent by design of the new blank for quick insertion in tool holders. Principal use of the Carmet blank is in facing and turning operations on gas turbine engine components.

Harvey Aluminum Makes 4,000-lb. Hand Forgings

Aluminum alloy hand forgings weighing up to 4,000 pounds will be produced on the 8,000 and 12,000-ton hydraulic forging presses Harvey Aluminum is installing at its Torrance, Calif. plant. For their production, Harvey is setting up a special operation in the ingot plant, installing new direct chill-casting equipment designed to cast ingot to a diameter of 32 inches or more.

"Aluminum alloy hand forgings from these new presses will satisfy the most extended weight, dimensional and metallurgical requirements anticipated by airframe and commercial manufacturers," said Lawrence A. Harvey, executive vice president.

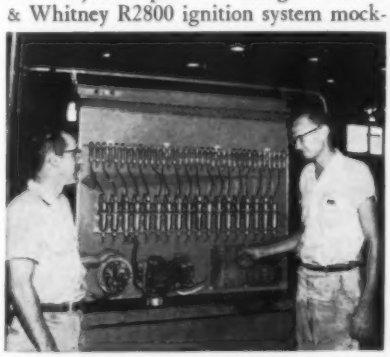
Too Much Paint Fouls Up Landing Gear Handle

A flight crew for a major DC-7 operator recently ran into difficulty returning the landing gear control handle to neutral position after takeoff gear-retraction. The reason—too much paint on the handle.

Investigation by the carrier showed that an overabundance of red paint in certain moving areas restricted the squeezing action of the control grip and prevented full ratchet disengagement. To prevent repetition of the incident, the airline warns maintenance personnel to chip off old paint first—then use a light paint coat in moving-part areas.

Ignition Training Aid

Apprentice mechanics in Braniff Airways accessory overhaul shop have used rejected parts to design a Pratt & Whitney R2800 ignition system mock-



up for classroom "troubleshooting" of DC-6 and Convair engines. The home-made device, designed by instructor R. L. Brooks, also serves a dual role as a training aid on the use of ignition analyzers.

People

MANUFACTURING

Joseph C. Brenner appointed vice president and works mgr. of the Sperry Electronics Tube Division, Sperry Rand Corp.

Brenner

Wood

Boeing Airplane Co. makes following appointments: **Lysle Wood,** vice president and gen. mgr. of Pilotless Aircraft Div.; **J. B. Connelly,** vice president and gen. mgr. of Transport Div.; **C. B. Gracey,** vice president and gen. mgr. of Seattle Div.

F. C. "Bub" Merrill appointed commercial aircraft sales mgr. for Temco Aircraft Corp.

J. C. Harrington joins Bristol Aircraft Limited as gen. service mgr.

R. C. Poucher appointed chief engineer of Nutt-Shel Co., Inc.

Roy Thorson named sales mgr. for Camair, Division of Cameron Iron Works.

George E. Beringer named asst. gen. mgr. of aircraft products at Bendix products division.

J. Leslie Lenton named gen. mgr. of Aero Supply Mfg. Co., Inc.

Dr. Arthur R. Kantrowitz elected vice president of Avco Mfg. Corp. and director of Avco Research Laboratory.

Maj. Gen. Lucas V. Beau (USAF, ret.) made vice president in charge of foreign operations of Consolidated Diesel Electric Corp.

Terrence M. Nolan named mgr. of product planning for Bell Aircraft Corp.; **Glenn Lord** appointed mgr. of systems and methods for Niagara Frontier Division.

Nolan

Richard M. Somers appointed dir. of engineering for Kansas City division, Bendix Aviation Corp.; **Carlton E. Spitzer** named advertising mgr. of Utica division;

Charles H. Shuff, of Westinghouse Electric International, succeeds R. B. Swanson as chairman of the Aircraft Industries Assn.'s Export Committee.

Scott Crossfield, former NACA test pilot at Edwards AFB, assigned to North American Aviation's X-15 rocket plane project.

Robert G. Hess appointed executive vice president of Pesco Products Division, Borg-Warner Corp.

Dean Randall made advertising mgr. for Minneapolis-Honeywell Regulator Co.'s Minneapolis divisions.

John Farley named director of public relations of Greer Hydraulics, Inc.

C. E. Meissner, formerly with Budd Company, now associated with Metallurgical Research and Development Co., Inc.

Dr. Wolfgang Harries joined the staff of the Research and Development Division, Air Association, Inc.

John Stribling named mgr. of Airwork Corporation's engine accessory overhaul shop in Atlanta.

Richard D. Maystead established an engineering and management consultant service to the aircraft accessory and equipment industry at Sepulveda, Calif.

Edgar A. Post appointed mgr. of Stanford Research Institute's Radio Systems Laboratory.

AIRLINES

B. B. Gragg promoted to asst. vice president of United Air Lines' sales-public relations administration.

Roger Lewis, former Assistant Secy. of the Air Force (Materiel) and now vice president of Pan American World Airways, named Pan Am representative on the Pan American-Grace Airways' board of directors.

John F. Barrett and **J. Robert Carter** appointed gen. traffic mgr. and asst. gen. traffic mgr., respectively, of Riddle Airlines.

George Herz promoted to mgr. of advertising and publicity for Scandinavian Airlines System, Inc.

Ross Angier appointed mgr.-air-freight development for American Airlines system; **Alan C. Botsford** named dir. of facilities maintenance at Tulsa overhaul and supply depot.

Charles M. Mashburn promoted to administrative executive-traffic and sales for Delta Air Lines; **Clint G. Sweazea** named regional mgr. for the Caribbean.

Delos W. Rentzel, board chairman of Slick Airways, assumes active management of the company as president on Mar. 1. His move is timed with departure of **Gordon M. Bain,** executive v.p., who becomes v.p.-sales of Northwest Airlines, replacing **James W. Mariner,** resigned.

Rentzel

Bain

H. D. Cameron appointed mgr. of Canadian Pacific Airlines' domestic lines; **J. G. (Pat) Twist** made asst. gen. mgr. of operations; **V. H. Perry** named asst. to the vice president.

George L. Strehlke appointed airline sales mgr.—United States, for Pan American World Airways.

Juan G. Restrepo Jaramillo appointed president and gen. mgr. of Avianca.

GOVERNMENT

Philip K. Allen named Deputy Asst. Secy. of Defense for Public Affairs, replacing **R. Karl Honaman** who resigned.

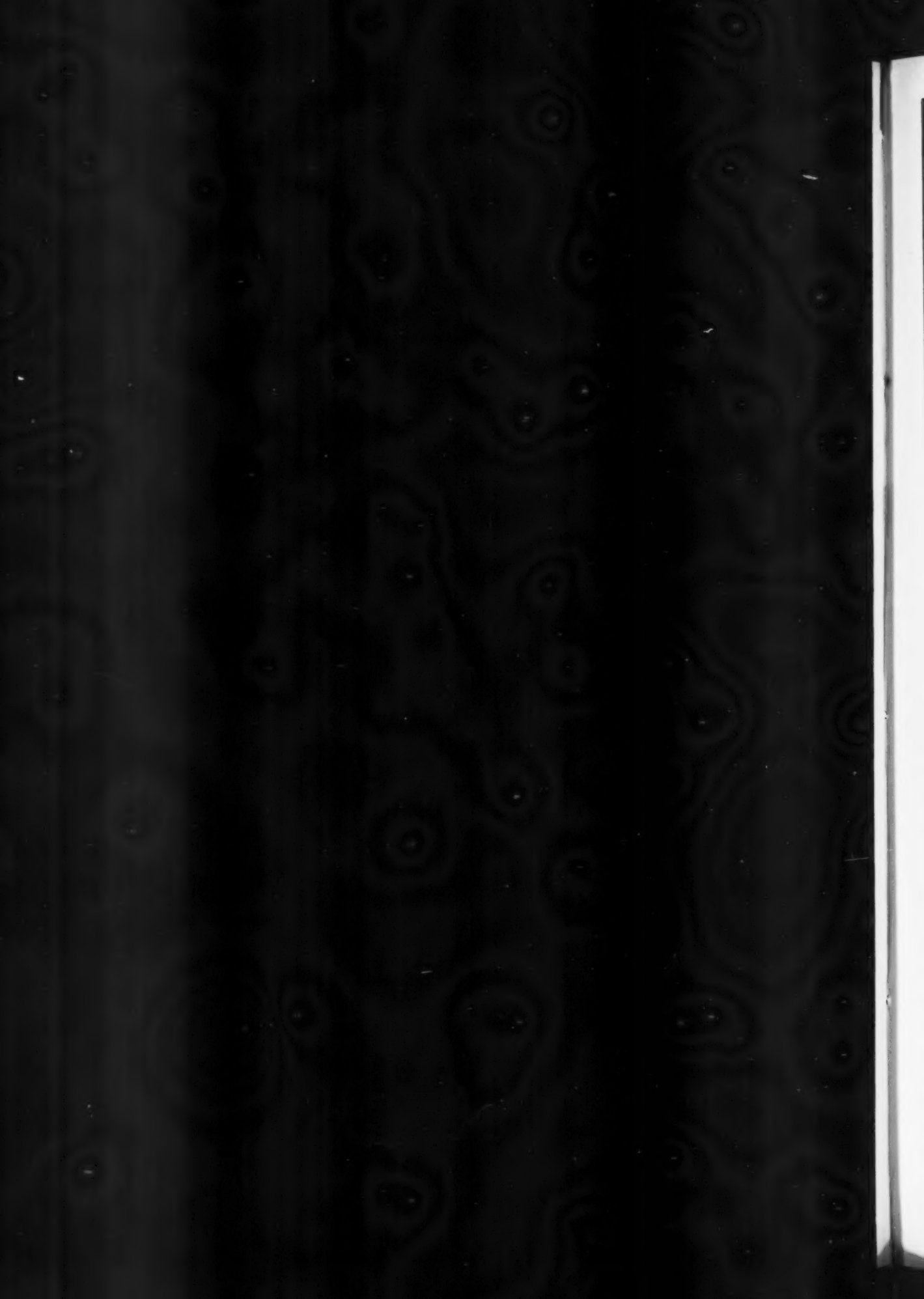
Bradley D. Nash resigned as Deputy Asst. AF Secretary for Civil Aviation to file as Republican candidate for Congress from the Second District of West Virginia.

William M. Holaday sworn in as Deputy Asst. Secretary of Defense (R&D).

HONORED

Frederick B. Lee elected president of the Aero Club of Washington.

Richard F. Bradley, aviation division mgr., Standard Oil Co. of California, named chairman of the American Petroleum Industries Committee's Aviation Advisory Committee for 1956.



West Coast Talk . . . By Fred S. Hunter

• Quietness may be biggest factor in competition between Boeing 707 and DC-8.

JUDGING from all the hub-bub over the noise problem, it looks like superiority between the Boeing 707 and Douglas DC-8 will be determined by whichever one is the quieter airplane. The numbers—performance, operating costs, etc.—all probably will come out about the same anyway because of the use of the same powerplants. So, a neat little trick in the acoustics department could pay off in big figures.

Hunter

On the ironic side in this question of noise is the fact that the bigger J75 engine will present less of a problem to the engineers than the J57. Having greater diameter, it will have lower exit velocities for any given thrust.

* *

What happens if the atomic reactor being flight tested in a Convair B-36 develops trouble aloft? Simple. It will be jettisoned. And following it to earth will be 10 parachute jumpers from a B-50 chase plane, who will secure the area in which it lands, thus preventing prying eyes from getting a gander at the reactor and also protecting any curious folk from harmful contact.

The jumpers, members of Convair's nuclear research and development section, have been specially trained for the work at the Air Force's 6511 Test Group at El Centro, Calif. Three made 10 jumps each to train as Jumpermasters and the others completed five jumps. Looks as though you can expect anything, if you work at Convair.

* *

The Garrett Corp. probably will move its industrial division into the middle west, but don't charge it up to military dispersal. Garrett's industrial division's principal product is a turbocharger for diesel engines and the big manufacturers of diesel equipment, like Caterpillar Tractor, are in the midwest area.

Bill Whitehead, new Garrett president, is counting on the industrial division to help materially in attaining the company's goal of 50-50 for the ratio of military and commercial business. He has a long way to go, but he's gaining. In the first six months of the current fiscal year, 87% of Garrett's business was military. It was 90% the year before.

* *

Not generally understood is the fact that deliveries of Lockheed Model 188 Electras to American and Eastern will be practically plane for plane. Also, when Allison's D15 engine, which will develop 4050 eshp, is ready, kits will be made available to the two carriers to convert their 3750 eshp D13 engines immediately to the higher power. Lockheed, incidentally, is stepping up its production scheduling on the Electra from the originally planned 10 and 11 planes a month to 12 and 14 because of the pressure for delivery positions.

* *

Los Angeles Airways is now carrying more than 1,000 passengers a month in its helicopters but is yet to establish service on its San Fernando Valley route. President Clarence Belinn visualizes hourly service on the San Bernardino route by the end of this year.

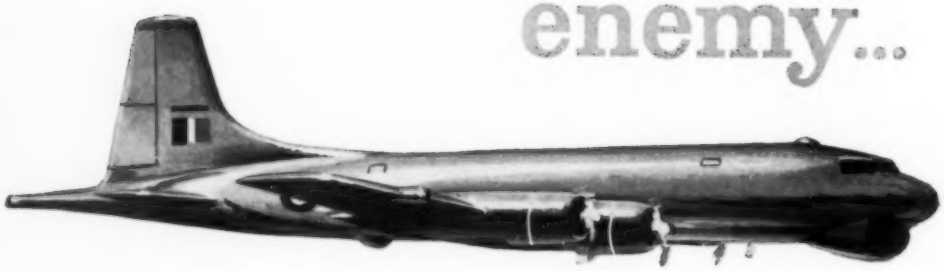
* *

Victer Olson, general manager of Airsupply Co., spells Victer with an "e", but it is of no consequence that it is invariably misspelled because everybody knows him as Vic anyway. Very popular guy, Vic . . . Whew! Some airlines are talking about 5,000 gallons of reserve fuel for their jet transports . . . Convair's R3Y turboprop flying boats will pack 20,000 to 26,000 pounds—depending on route altitudes flown—when they go into service between Alameda and Honolulu . . . New powerplant engineer at Marquardt Aircraft is Richard E. Marquardt, no relation to President Roy E. Marquardt.

* *

Phase IV performance and stability tests on Convair's F-102A, which incorporates the "area rule" concept, are about complete and Phase VI service testing has already started at the Air Force Flight Test Center at Edwards AFB . . . Two major deficiencies were discovered and corrected during the Boeing B-52 Phase VI program at Edwards.

To seek the hidden enemy...



Soon, the oceans around Canada will be patrolled by the first aircraft developed specifically for Canadian maritime reconnaissance duties . . . the Canadair-designed CL-28.

Developed from the Bristol Britannia class by Canadair, this is the largest aircraft ever to be manufactured in Canada and we at Canadair regard it as a tribute to our capabilities that the RCAF selected us to do the job.

Size, of course, is not the only factor, for we are equally at home in the design and production of jet fighters, training planes, airliners, guided missiles or even components for other aircraft. What counts most is our outstanding record for cost performance, on-time deliveries and quality of manufacture.

C-L CANADAIR

LIMITED, MONTREAL, CANADA

AIRCRAFT MANUFACTURERS

A subsidiary of GENERAL DYNAMICS CORPORATION, New York, N.Y.—Washington, D.C.

CA56-1115T

CANADAIR HAS PRODUCED MORE JET AIRCRAFT THAN ANY OTHER CANADIAN MANUFACTURER

International Aviation

By Anthony Vandyk

The most frequent service operated over an international route is provided by a small British airline between two points that few people could place on a map. The carrier is Silver City Airways and the points are Lydd, on the southeast coast of England, and Le Touquet on the northwest coast of France.

Frequencies vary with the time of year but between June 15 and September 17 this summer no less than 27 roundtrips daily will be operated between the two points. An additional 17 roundtrips daily will be flown between Lydd and Calais, another coastal town in northwest France. Flying time on both routes is a mere 20 minutes.

The reason for the high frequencies on these short routes between England and France is that Silver City Airways specializes in the transportation of automobiles. Since a maximum of three cars can be carried in its Bristol 170 Freighters and Superfreighters, many flights have to be made to meet demand in the peak season.

• **This summer** Silver City will operate 53 roundtrips daily between England and continental Europe, principally over the routes mentioned above. It also flies from England and Scotland to Northern Ireland but its main business is between England and France.

Last year Silver City carried 44,670 cars on its ferry services, 44% more than in 1954. In addition, it transported 8,774 motorcycles, 3,657 bicycles and 166,219 passengers. Its heavy vehicular traffic is responsible for Silver City's claim that it is the world's largest carrier of air cargo—it carried 72,333 tons last year.

• **Because most of** Silver City's flights are very short—less than half an hour—the company's Bristol 170s take quite a beating. Last year they averaged 3,414 landings and takeoffs per aircraft. The safety record on Silver City's car-ferry operations have been perfect.

The twin-engine Bristol 170 makes an ideal car-ferry aircraft, because of its clamshell-door nose. Cars are driven on and off the aircraft in a few seconds. In the rear of the Silver City Bristols there are accommodations for passengers.

Silver City is particularly proud of its base at Lydd, known as Ferryfield. This is the only airfield built in Britain since the war and it was designed specially for handling vehicular traffic. The facilities are laid out in such a way that passport and customs formalities are carried out very speedily.

Japanese Version of Lockheed Trainer

First Japanese-built Lockheed T-33A has made its first flight. Kawasaki Aircraft has a contract to build about 100 trainers under license for the Japanese security forces.

Masefield Predicts Britannia Production Of One Weekly by Early 1958

Bristol and Short Bros. & Harland will be producing one Britannia a week by 1958, Peter G. Masefield told AMERICAN AVIATION in Washington this month. Bristol Aircraft's managing director said that a customer ordering now could get delivery of a long-range Britannia in February 1958.

Production of the Britannia 100 is now almost half completed, with the sixth due to fly February 27. The last of BOAC's 15 Model 100s is due to be delivered by March 1957. Thereafter production will be devoted exclusively to the stretched-fuselage versions of the Britannia.

The first stretched-fuselage Britannia, the 301, is due to fly May 25. Production 302s for BOAC will be delivered early next year from Short Bros. & Harland's second source line at Belfast. A recently placed contract for six Bristol Britannia 253 combination freight/passenger aircraft for RAF Transport Command is to be executed by Short's. El Al will get its Britannias starting in March 1957.

• **Masefield gave** the Britannia's high-speed cruise as 409 mph and its long-range cruise as 360 mph. He said that with 16,000 lbs. payload the 310 series Britannia has a range of well over 6,000 miles. With its maximum payload of 28,000 lbs. the range is 4,320 miles. Britannia flying time is now getting up toward the 4,000-hour mark.

Meanwhile, discussions continue between Canadair and Bristol on the manufacture of a civil version of the Britannia CL-28 maritime reconnaissance aircraft now being built by the Montreal company. It is understood the discussions imply granting Canadair license rights to produce this aircraft for the North American civil market. It will be similar to the Bristol Britannia 310 and equipped with Proteus 755 engines (or BE 25s at a later date). The CL-28 is powered with Wright turbo-compounds.

MANUFACTURING BRIEFS

Turbomeca has almost completed a pre-production batch of Gabizo 2,420-lb.-thrust turbojets. One of the engines has satisfactorily completed a 150-hr. test run . . . **SNCA du Nord** has started test flights with a Noratlas transport powered by P&W R-2800 engines instead of the standard Bristol Hercules . . . **SNCA du Sud-Est** now promises delivery of its Alouette II helicopter one year after the placing of the order.

AIRLINE BRIEFS

Swissair has ordered two DC-8s for delivery in the first half of 1960 and has taken an option on a third . . . **East Germany's Lufthansa** started operations on February 4 with a service between Berlin and Warsaw with Ilyushin IL-12s

MILITARY BRIEFS

The **British Admiralty** has decided to cancel its order for the Bristol 191 twin-rotor helicopter and instead will probably buy license-built (by Westland Aircraft) version of the Sikorsky S-58. The **RAF** order for the Bristol 191 is not affected . . . The **Indian Air Force** has been loaned two Turbomeca auxiliary jet units for experimental installation on C-47 transports . . .

NBAA Protests CAB's Proposed Takeoff and Landing Rule Changes

National Business Aircraft Association has launched sharp protest with CAB over a proposed rule change it says will arbitrarily ground many executive transports.

The planned amendment, affecting Civil Air Regulations, Part 43, would limit the takeoff and landing weight of business transports according to airport altitude. Specifically, it would require that operators not exceed the maximum allowed takeoff weight spelled out in the flight manual for the elevation of the airport at which a takeoff or landing is made.

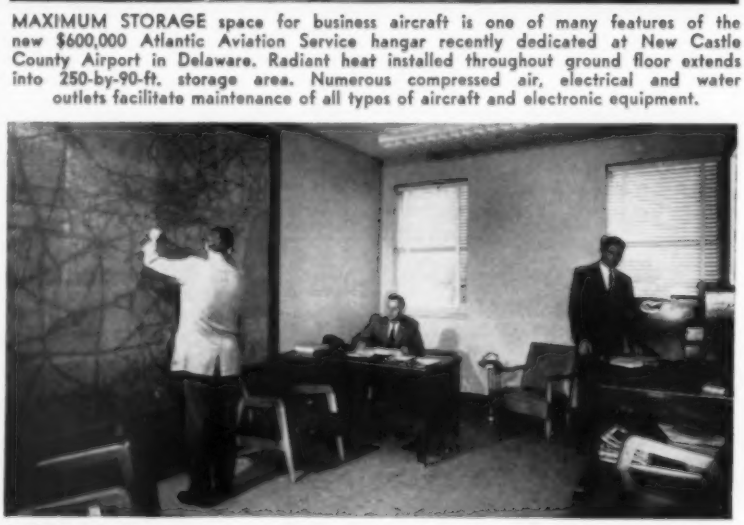
Until now CAR 43 has permitted business aircraft to take off and land using sea level maximum weights regardless of airport altitude.

NBAA says the Board's proposal would penalize Lockheed Lodestars certificated at gross weights above 18,500 pounds, including the Learstar. Also affected are DC-3s, with authorized weights over 25,200 pounds; Convairs, Martins and larger Douglas four-engine types.

NBAA's board of directors, anticipating "serious effects" if the rule is adopted, has asked for a complete study by CAB to determine whether there is a demonstrable need for its adoption. It also asks that CAB schedule a public hearing on the proposal before any final action is taken.

CAB officials explain that the proposal was originated to clarify in Part 43 similar rules already stipulated in Parts 40, 41 and 42 covering airline transport operating weights. In view of the stand taken by business aircraft operators, public hearing on the issue probably will be granted, one CAB spokesman said.

MAXIMUM STORAGE space for business aircraft is one of many features of the new $600,000 Atlantic Aviation Service hangar recently dedicated at New Castle County Airport in Delaware. Radiant heat installed throughout ground floor extends into 250-by-90-ft. storage area. Numerous compressed air, electrical and water outlets facilitate maintenance of all types of aircraft and electronic equipment.



PILOT'S LOUNGE combines working tools for his trade along with accommodations for relaxation and "hangar flying" sessions between flights.

Retractable Table Made For Business Planes

A retractable table that can be installed in Twin Beech and Lodestar aircraft is offered by the **Ohio Aviation Co.**

Weighing 12 lbs., the table is suitable for writing, eating, card-playing or other games. With top open, a writing area of 28 x 18 in. is provided. When not in use, the table retracts against the side of the plane and extends only 4½ in. in the closed position.

The table can be finished to harmonize with the plane's interior. The surface is covered by replaceable felt inserts. A standard-sized radio can be built into the table.

Narco Offers VHF Unit For Business Aircraft

National Aeronautical Corp. of Ambler, Pa. this week announced the marketing of its new airline-type VHF communications unit for business aircraft. Designated the Sapphire 1016, it is the first combination aircraft transmitter-receiver on the market which meets the new CAA Technical Standard Order requirements for this standard of equipment. It complies with TSO C-37 and C-38.

The Sapphire 1016 is Narco's first corporate aircraft communication gear which provides 90 to 360 transmitter channels and up to 560 receiver channels. Weighing at 24¾ pounds, the unit occupies a one-half ATR rack. It is said to be 50% smaller than similar channel equipment.

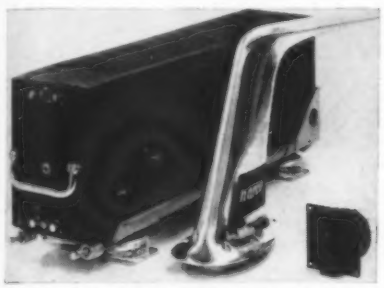
Special crystal circuitry permits crystal-controlled reception on 560 channels with only 48 crystals and 38 crystals for the 360 channel transmitter capacity. The miniature crystals used are similar to the type used for the first time in Narco's DME (Distance Measuring Equipment).

If transmission and reception is desired on the same frequency, a single channel selector mounted on the instrument panel is provided. For cross-band communication, it can be installed with separate frequency selectors mounted side-by-side. The receiver permits 50-

kilocycle separation through the entire range of channels from 108 to 135.95 megacycles. Transmitter operates from 118 to 135.95 megacycles.

The equipment has been engineered to allow addition of VOR and localizer functions, as well as other components of a complete VHF navigation system under development at Narco.

The basic Sapphire 1016 is offered with 90-channels each for transmission and reception at a price of $2,490. The full capacity 360 channel transmitter and 560 channel receiver is priced at $2,900.



Circle No. 140 on Reader Service Card.

Business Flying Briefs

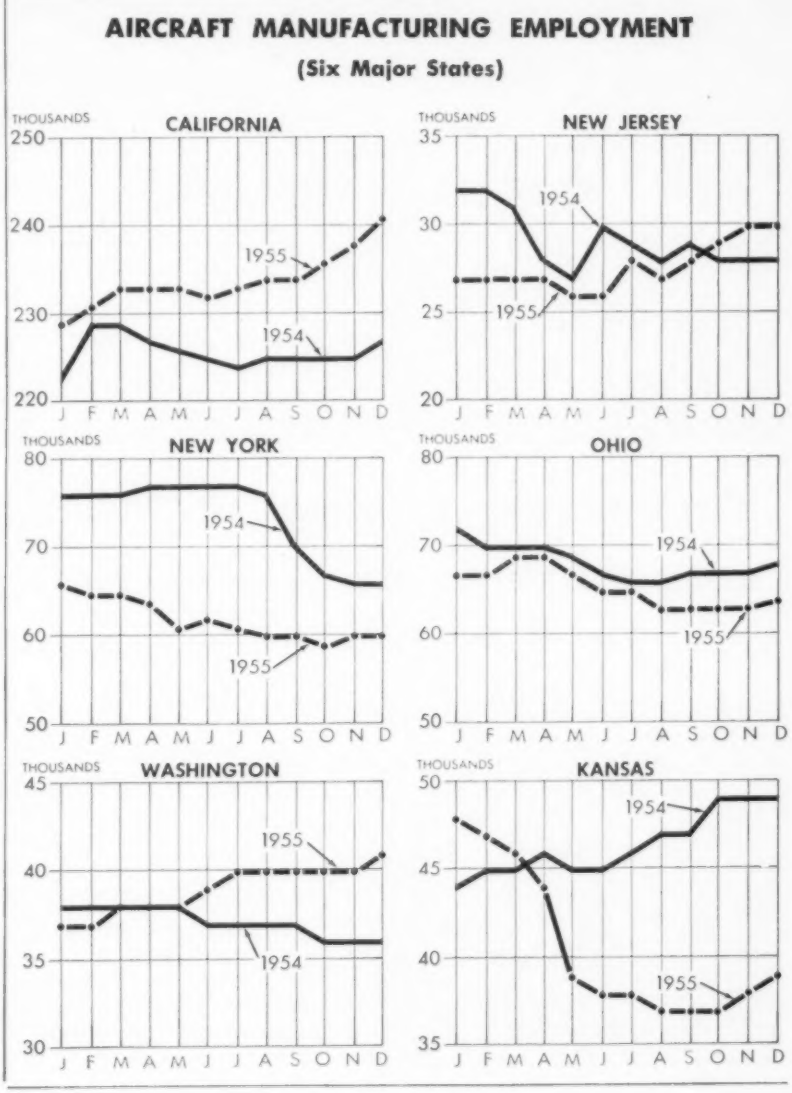
• **Temco Aircraft Corp.** is organizing a nationwide sales and distributor network for its Riley Twin Navion conversion. Distribution heretofore had been contracted out. In the new set-up, F. C. "Bub" Merrill has been named to the newly created post of commercial aircraft sales manager. Headquarters of the sales organization is at Greenville, Tex., plant.

• **CAA** has set an August 1, 1956 deadline for complying with an airworthiness directive calling for replacing or modifying Thompson TF-100 engine drive fuel pumps, extensively used in Bonanzas, Navions and similar aircraft. By that time the pump either must be removed and replaced with Thompson TF-1900 pumps having larger diameter drive pin; or converted to TF-1900 pumps modified in accordance with Thompson Service Bulletin ESD-182A and Amendment ESD-182B.

• **Steward-Davis, Inc.** of Gardena, Calif., has entered into a contract to supply Howard Aero of San Antonio with new Pratt & Whitney R-2800 engines for the latter's Super-Ventura executive conversions. All engines contracted for will be modified, modernized and brought to newly developed R-2800 specifications in Gardena.

• **Plans for expansion** of Chicago's executive aircraft airport, Mieg's Field, call for eventual construction of a second parallel runway and for tripling aircraft parking area. Expansion is predicated on the tremendous traffic increases recorded. In January alone a whopping 62% increase in aircraft operations were reported over January, 1955, along with passenger totals climbing 85%. Plane operations for last month totaled 3,639 and passengers 11,674.

Pulse Of The Industry



Financial

• **North American Aviation** reported $7.1 million preliminary net earnings for first quarter of fiscal year (ended Dec. 31, 1955), against $5,950,000 profit for same 1954 quarter. Sales were $195,935,978 against $177,493,327.

• **Garrett Corp.'s** earnings totaled $2,331,000 for first half of current fiscal year, compared with $1,681,000 net in same period last year. Sales were $62,457,000 vs. $47,949,000. Backlog at close of period was $110 million.

Contracts

Recent Air Force contract awards announced by Commerce Department include:

Allison Div., General Motors Corp., Indianapolis, $31,905,800, for T56-A-1 turboprop engines.

North American Aviation Inc., Fresno, Calif., two contracts totaling $7,992,977 to provide and install extended leading edges and advanced electronic systems in 900 F-86D fighters; $3,300,000, long lead-time items for F-86Fs; $282,240, cockpit procedure trainers.

Hoffman Laboratories, Los Angeles, $11,-775,677, for 412 antenna drives.

Crosley Div., Avco Mfg. Corp. Cincinnati, $10 million, MD-9 bomber fire control system.

General Electric Co., West Lynn, Mass., $584,350 and $2,083,156, in-flight refueling transmitters.

Sundstrand Machine Tool Co., Rockford, Ill., $1,359,173, transmission assemblies, valves and covers.

Hughes Aircraft Co., Culver City, Calif., $2,340,000, control surface tie-in components for 900 F-86Ds.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., $377,786, wheel and brake assemblies for F-86Fs; $3,767,990, wheel assemblies; $4,899,467, wheel and brake assemblies.

Champion-equipped F-100C Super Sabre sets supersonic speed record...822 mph!

Air Force Officer pilots North American jet to new world speed mark

This electronic timer, used to clock the record run, measures time down to a fantastic 1/100,000th of a second.

High-altitude scanner with telescopic viewfinder, specially designed to check on aircraft speed trials.

Flashing through the sky eight miles above California's Mojave Desert, an Air Force North American F-100C Super Sabre streaked to a new official world's speed record . . . a supersonic 822.135 miles per hour. The pilot twice guided the speeding ship over the 11-mile course . . . once at 773.644 mph, and once at an astounding 870.627 mph, for an average speed of 822.135 mph . . . bettering the previous record by more than 70 miles per hour!

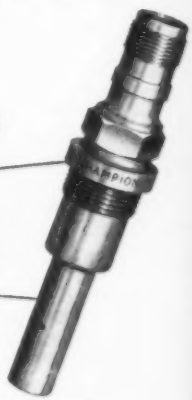
The speedy Super Sabres are powered by Pratt & Whitney J-57 turbojet engines delivering over 10,000 pounds thrust. Champion Jet Igniters are original equipment on these engines, as on most leading jets. Champion dependability is important in jet engines, for in case of a "flame-out" the jet igniters must refire the fuel—quickly! Because Champion has an outstanding record for producing a dependable, quality product, leading manufacturers choose Champion to fire the flame that sends their jets flashing through the sky.

Dependability is equally important in piston engines. And for the most dependable spark plugs you can buy for aircraft or auto, get full-firing, long-lasting Champions.

ALWAYS DEPENDABLE

CHAMPION

SPARK PLUGS



CHAMPION SPARK PLUG COMPANY • TOLEDO 1, OHIO

Circle No. 27 on Reader Service Card.

TRANSPORT TRENDS

Washington, D. C., Feb. 27, 1956

AIRLINE RESEARCHERS NOW LOOK for domestic trunks to show a 14% to 16% gain in revenue passenger-miles this year. Last year's growth was 18-19%.

CAB WILL RENEW all-cargo certificates of Slick and Flying Tigers. Decision is now being written. And majority of four-man Board is said to favor giving cargo lines certificates to carry mail. Intervention by Postmaster General Summerfield helped sway thinking on certificates.

MORE TRAFFIC CONTROLLERS ARE LEAVING CAA for Air Force jobs. Reasons: insecurity, unrealistic CAA pay scale. In one week this month, eight controllers (some supervisors) sacrificed restoration rights with CAA to take more attractive civil posts with USAF. Four of last five chief controllers at Chicago—busiest U.S. terminal—are now on USAF payroll.

Shift started about a year ago. CAA morale was at all-time low following reduction-in-force notices. And agency's policy of paying "milkrun" controllers the same or more than those handling high-density areas was a big factor.

Result: there's hardly a USAF base command that doesn't have a former CAA expert as traffic control "consultant"— and at a much higher salary.

INDUSTRY IS STILL BUZZING over Howard Hughes' announcement on purchase of eight Boeing 707 jet transports. Press release said Hughes Tool Co. would turn planes over to its "subsidiary," TWA. This is believed to be first use of "subsidiary" to describe the airline. Company officials were plenty irked. Release was issued for Hughes through Carl Byoir & Associates, public relations firm. TWA was told to keep hands off.

SOME AIRLINES ARE LOSING OUT on a 2-2 split vote in CAB. Such votes are counted as negative for lack of a majority. Impasse comes from delay of Senate Interstate & Foreign Commerce Committee in acting on nomination of G. Joseph Minetti. CAB wants Congress to prevent similar situations from occurring in the future. It has asked legislation permitting a member whose term expires to serve until a successor is sworn in.

THERE'S SPECULATION THAT American Airlines may be readying something new in coach service. TWA and United asked CAB to extend $80 transcontinental coach fare (good Mondays through Wednesdays on roundtrips with 30-day limit) for six months. AA requested only two-month extension. Official reason: AA hasn't decided whether low fare should apply during peak summer season. But there have been rumors that AA plans to start (1) all-coach DC-7, or (2) combination first-class/coach DC-7.

LOOK FOR INSTALLATION later this year of a British Decca navigation system in New York area. There's nothing official yet, but Air Navigation Development Board plans the project for helicopter navigation evaluation.

Reason: New York Airways' helicopters are now second only to American Airlines in arrivals and departures at La Guardia Field.

DEPUTY CAA ADMINISTRATOR WILL BE NAMED SOON. He'll be James T. Pyle, now special assistant for civil affairs to Assistant Navy Secretary for Air.

CAB Cracks Down on Airfreight Rebates

Some airlines found to be paying commissions to questionable persons to obtain business; voluntary compliance is sought, but severe penalties are possible.

By WILLIAM V. HENZEY

THE practice exposed by this story is termed a "gimmick" by Government officials. But, they hasten to add, it is a costly "gimmick" both financially and morally.

It concerns the usually taboo subject of "rebates" in the airfreight industry. So serious has it become that 2c out of an average 20c per ton-mile is drained off many operators' freight revenues through what the Government considers unlawful means.

The Compliance Office of the Civil Aeronautics Board has asked for a cooperative termination of the practice. If that's not possible, penalties are threatened which range from a $5,000 fine for each offense under the Civil Aeronautics Act to much more severe punishment under the criminal code.

• **The practice** most frequently works this way. A forwarder tenders cargo to an airline for carriage. The airline pays a "commission," usually 10% based on monthly tonnage tendered by the forwarder, to a third party whose exact function in the transportation arranged and carried out is questionable if not non-existent.

It has been found that part or all of the commission so paid to the third party goes back to the forwarder. This, of course, in the absence of a Government-approved agreement between the airline and forwarder, amounts to a rebate by the airline to the forwarder no matter how devious the route of the money handed back.

• **The Civil Aeronautics Act** specifically prohibits rebates in any form. The Board itself, less than a year ago, refused to approve an agreement under which The Flying Tiger Line proposed to grant a 10% discount on certain commodities shipped on its line by Airborne Flower & Freight Co., an authorized forwarder.

The CAB position at that time was that a forwarder is a shipper and that granting preferential rate treatment to one shipper to the exclusion of all others is in violation of the Act.

It has not been determined how many companies specifically are involved in the practice. But airlines that may have condoned the idea in the beginning now appear to have been caught up in a mushrooming practice that is difficult to end.

• **CAB letters** complaining of the practice went to Slick, Flying Tigers, and the combination passenger-cargo scheduled airlines. All freight forwarders were advised of the situation, although only approximately eight have been active in the commission "gimmick."

It is considered entirely legal for an airline to pay a commission to a cargo sales agent for traffic obtained by that agent from a forwarder when the payment of such a commission is provided for by a proper agreement between the airline and the agent.

But the rebate problem goes beyond that. Here is how CAB's Compliance Chief James Anton describes it:

"In actual practice and as part of the agreement between the airline and the forwarder, the commissions are computed on the basis of the monthly volume of shipments delivered to the direct air carrier by the air freight forwarder. Directly or indirectly, the commissions are then passed along to the air freight forwarder. In no instance has an agreement been filed with the Board covering this method of computation and payment of commissions."

• **For example,** in a given month a forwarder may ship $20,000 worth of freight via one airline. The carrier pays, say 10%, or $2,000 to the sales agent. This goes back, by one means or another, to the forwarder who has thus shipped for $18,000 what would cost another shipper $20,000.

The methods by which the sales agent transmits the commission from the airline to the forwarder vary. "Some," according to Anton, "are by direct payments by the sales agent, by certain rental agreements or by the sales agent paying a premium for space rented from the forwarder, by the sales agent providing free or discounting its charges for pickup and delivery service, and by carrying on its payroll employes of the forwarder."

The Compliance Office believes that in each such instance the airline and the forwarder are in violation of the Act since the overall agreement which is not filed with the Board "is a contract for the pooling or apportioning of earnings between air carriers."

Delta Orders Six DC-8s

President C. E. Woolman of Delta Air Lines looks over model of DC-8 jet with Delta markings after placing a $28.5-million order with Douglas for six aircraft. Four of Delta's DC-8s will be powered by Pratt & Whitney J57s, two by J75s. First delivery is due June 1, 1959 with first passenger service planned for "autumn 1959."

• **The majority of airlines,** forwarders and cargo sales agents are not involved in this practice. But they stand to suffer by its continuance. From the airlines' standpoint, if one carrier is permitted to make rebates to secure the business of a forwarder, then for competitive reasons other carriers will be forced into the same practice with its resulting 10 or 15% drain on revenues.

Most forwarders frown on it because it pegs their industry as "gimmick-workers," with the many being penalized for the vices of the few.

The same goes for the many legitimate cargo sales agents who receive commissions for business actually tendered to the airlines.

• **The CAB Compliance Office,** following its normal procedure, has been pointing out to the apparent violators that an early solution can be worked out. However, if it fails, here, in Anton's words, are "other possible aspects" of their conduct:

"Sec. 902(d) of the Act, among other things, makes it a misdemeanor for any air carrier, or any officer, agent, employe, or representative thereof, to knowingly and wilfully grant or give, or cause to be granted or given, any rebate or concession, or by any device or means to suffer or permit any person to obtain transportation or services subject to the Act at less than the rates, fares or charges lawfully in effect.

"Upon conviction, the penalty for each offense may be a fine of $5,000. In addition, if it should be found that these arrangements were entered into and carried out with the purpose of deceiving the Board and obstructing its lawful operations, they might amount to a conspiracy within the provisions of Section 371 of Title, U. S. C. The penalty upon conviction of such an offense would, of course, be much more severe than any provided for in the Civil Aeronautics Act." ◈ ◈ ◈

Boeing 707 in TWA Markings

First eight of a fleet of 30 jet transports to be ordered by Howard Hughes for Trans World Airlines will be Boeing 707s shown in artists' view. These TWA jets will be powered by Pratt & Whitney J57s and are slated for delivery between April and August, 1959. Hughes says remaining 22 aircraft will be ordered "within the next few months."

Are Airlines Overbuying? No, Says Canadair's Sales Chief

There's no cause for pessimism, Karl Larsson says, pointing out that all previous traffic forecasts have been too conservative.

By ANTHONY VANDYK

Are the airlines on an unrealistic equipment buying spree or are they merely engaged in a carefully-planned program to take care of increasing volume of traffic in the years ahead? Widely differing answers to these questions have come recently from highly reputable sources. The February issue of *Fortune* magazine questions whether "the volume of traffic can grow fast enough to fill the incredible flock of new planes that the airlines now have on order."

Although personally optimistic that no period of excess capacity is in prospect, John Brancker, Traffic Director of the International Air Transport Association, has admitted that there are definite factors to support the view that the industry may be heading through overoptimism to a state of overproduction, and a surplus of capacity. His views on the pitfalls of too much capacity appeared in AMERICAN AVIATION January 30.

• **On the other hand,** Karl Larsson, chief sales engineer of Canadair Ltd., can see no reason for pessimism. In fact, in a recent study made for his company, he declares that all previous forecasts of air traffic growth, with one exception, have been ultra conservative despite their recognition of the airplane's future potential. In his study, he has compiled his own highly optimistic forecast which is reproduced in the accompanying tables (page 72).

Larsson was chief engineer of Scandinavian Airlines System before coming to Canada in 1950. He attributes the conservative note in previous forecasts (including that issued by CAA last year) to the practice of tying the overall traffic volume to national economy, and dividing it between the private automobile and the common carrier. This system, he says, usually favoring the automobile at the cost of the latter.

Larsson does not accept this philosophy, which depicts the total traffic volume as a cake out of which each mode of transport is only entitled to a certain piece. He considers that a new mode of transport sells itself on its own merits, regardless of others, and competes not only with the other means of transport but with any and all of other public expense items.

• **Larsson traces** the rapid growth of air transport to its superior selling factors over other modes of transport in four respects—speed, fares, safety and convenience. In regard to speed, he points out that the railroad train has hardly improved in the past 50 years.

In 1941 the average train speed was 36 mph; ten years later it was only 1 mph more—37 mph. Streamlined and lightweight trains will not increase this figure greatly unless they are widely accepted and supersede present equipment on a large scale. Bus speeds have gone up by about 1% per year over the past ten years and currently average about 40 mph.

The airplane, by contrast, is rapidly increasing its speed and shows no sign of reaching its limit. In 1945 the average airline block speed in the U.S. was about 150 mph or some four times the speed of rail and bus. By 1950 this ratio has increased to over five while in 1960, with the introduction of turbine trans-

ports, the airlines will offer a speed more than seven times greater than the average for surface transport.

• **As for fares** there is nothing to indicate that the buses and railroads will be able to lower their cost of operation and thus cut fares. The introduction of diesel-electric power on the railroads brought about a considerable saving in fuel but this source of cost reduction has already been tapped.

Air transport, on the other hand, continues to offer the same fare levels or even reduced rates, in the face of a rising cost-of-living index. Turbine power promises an improvement in operating cost which will undoubtedly be passed on to the public in the form of lower fares. This, Larsson concludes, should accelerate the process of air transport penetration in the common carrier market.

• **In the area of safety** the airlines are constantly improving their performance. In 1955 they had 0.75 fatalities per 100 million passenger-miles. Railroads and bus companies have for a long time averaged about 0.20 fatalities per 100 million passenger-miles. Private automobiles and taxis, on the other hand, have a poor record—2.90 per 100 million passenger-miles in 1953, the last year for which statistics are available.

Under the heading of convenience the following factors are considered: comfort, frequency, regularity, through connections and non-stop service. The railroads have gradually improved their rolling stock since reaching a low mark during World War II. Nonetheless, despite the introduction of all-steel cars, airline-type seats and air-conditioning, a train ride today is still very much the same as it has been for years past.

• **Buses have undergone** the same sort of gradual improvements as the trains but there has been no fundamental change. The airlines, on the other hand, are constantly making their passengers more comfortable: pressurized aircraft and turbine power (with its reduced vibration and noise) are the obvious examples.

As regards punctuality and regularity the airlines have still some way to go before they can attain surface transport standards. Nonetheless, there is constant improvement and every indication that the airlines will soon catch up with the trains and buses in this respect.

Thus, Larsson shows that whereas rail and bus have largely exhausted their means of improving transport efficiency, the airplane is still in the middle of a process of technological progress which will at least allow it to continue and, more probably, to improve on the past trend. ◆◆◆

Actual & Future Growth in U.S. Domestic Air Transportation

Scheduled Passenger-miles, Growth Increment and Growth Rate

Year	Scheduled pass. miles (millions)	Growth Increment (millions)	Growth rate %
ACTUAL			
1945	3,362	1,184	54.4
1955	19,900	3,131	18.7
FORECAST			
1955	19,170	2,400	14.3
1956	21,770	2,600	13.6
1957	24,570	2,800	12.9
1958	27,570	3,000	12.2
1959	30,750	3,180	11.5
1960	34,100	3,350	10.9
1961	37,590	3,490	10.2
1962	41,220	3,630	9.7
1963	44,980	3,760	9.1
1964	48,850	3,870	8.6
1965	52,820	3,970	8.1
1966	56,880	4,060	7.7
1967	61,020	4,140	7.3
1968	65,230	4,210	6.9
1969	69,500	4,270	6.5
1970	73,820	4,320	6.2

Actual and Future Growth in World Air Transportation

Scheduled Passenger-miles, Growth Increment and Growth Rate

Year	Scheduled pass. miles (millions)	Growth Increment (millions)	Growth rate %
ACTUAL			
1945	5,108	1,696	49.8
1950	16,960	2,480	17.1
1955	38,530	5,910	18.1
FORECAST			
1955	37,800	4,850	14.7
1956	43,050	5,250	13.9
1957	48,700	5,650	13.1
1958	54,700	6,000	12.3
1959	61,100	6,400	11.7
1960	67,800	6,700	11.0
1961	74,800	7,000	10.3
1962	82,100	7,300	9.8
1963	89,600	7,500	9.1
1964	97,350	7,750	8.6
1965	105,300	7,950	8.2
1966	113,450	8,150	7.7
1967	121,725	8,275	7.3
1968	130,125	8,400	6.9
1969	138,625	8,500	6.5
1970	147,225	8,600	6.2

Actual & Future Growth in U.S. International Air Transportation

Scheduled Passenger-miles, Growth Increment and Growth Rate

Year	Scheduled pass. miles (millions)	Growth increment (millions)	Growth rate %
ACTUAL			
1930	19		
1940	100	28	38.9
1945	448	137	44.1
1950	2,206	152	7.4
1955	4,430	687	18.4
FORECAST			
1955	4,570	560	14.0
1956	5,170	600	13.1
1957	5,810	640	12.4
1958	6,485	675	11.6
1959	7,195	710	10.9
1960	7,935	740	10.3
1961	8,705	770	9.7
1962	9,505	800	9.2
1963	10,325	820	8.6
1964	11,165	840	8.1
1965	12,025	860	7.7
1966	12,900	875	7.3
1967	13,785	885	6.9
1968	14,680	895	6.5
1969	15,585	905	6.2
1970	16,500	915	5.9

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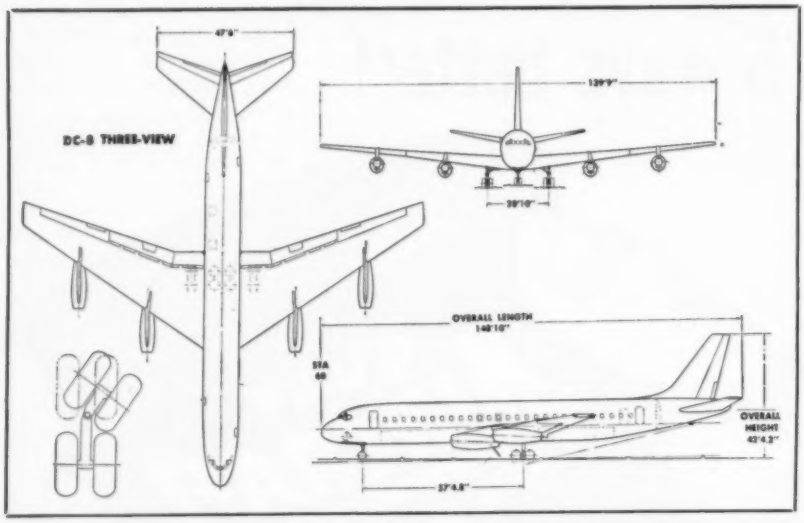
Douglas Stretches DC-8 to Boost Seating Capacity

Wingspan of new version is 139 ft., 9 in., fuselage extended to 148 ft., 10 in.; will accommodate 122 first-class passengers, 144 coach.



Douglas Aircraft Co. has moved up to a somewhat larger DC-8 jet transport in complying with the desires of airline customers for more seats and lower seat-mile costs.

The new version of the airplane has a wingspan of 139 feet 9 inches, length of 148 feet 10 inches and a clearance height of 42 feet 4 inches.

There is only the one profile, but there are two weight levels: 265,000 pound take-off gross for domestic or general use and 287,500 pounds for the intercontinental or long-range operator.

• **The basic airplane** is available in domestic models with either Pratt & Whitney JT3 (J57) or JT4 (J75) turbojet engines and in overwater or extended range models with the JT4. Both models also are being offered with the Rolls Royce Conway by-pass engine.

The Conway is expected to be available for airplanes which could be delivered in 1960. Douglas specifications show advantages of Conway power in the intercontinental version would be longer range and lower operating costs. An installation of four of the by-pass engines would weigh about 5,000 pounds less than four JT4s.

During the process of refinement, which Douglas says has been taking place over the past six months of active negotiations with customer airlines, the span of the 30-degree swept wings has been increased five feet by adding at the root. This change adds 160 feet to the wing areas and permits carrying 20,000 pounds more fuel.

• **The fuselage** has been lengthened 100 inches to provide space for up to 19 more passengers in tourist configurations. The standard first-class DC-8 cabin will contain from 118 to 122 seats, with individual arrangements varying according to airline requirements. All-tourist cabins will accommodate up to 144 seats, with rows spaced 40 inches apart, the same as on current standard-fare aircraft. This also coincides with the 40-inch space of the 15 by 18½-inch "skyview" windows.

Combinations of two or three classes of service, including sleeping accommodations, can be arranged by installing bulkheads in the cabin.

Normal cruising speed of 550 mph and top cruising speed of more than 580 mph remain unchanged by the minor modifications in the DC-8, but maximum range has been stretched out

DOUGLAS DC-8 SPECIFICATIONS

Data Applicable to All Models

Wing Area	2,758 sq. ft.
Wing Span	139' 9"
Overall Length	148' 10"
Overall Height	42' 4"
Wing Sweepback @ 25% Chord	30
Landing Gear Type (Swivel Caster)	Dual Tandem
Turning Radius (for wing tip clearance)	91' 1"
Lower Cargo Compartments (2) Total Volume—Both Compartments	1,445 cu. ft.

Data Applicable to Specific Models Listed*

	J57 Domestic First Class	J75 Domestic First Class	**J75 Intercontinental (Mixed 1st	Conway Intercontinental Class-Tourist)
Engines	JT3C-4 (J57)	JT4A-3 (J75)	JT4A-3 (J75)	Conway
Design Gross Weight (lbs.)	265,000	265,000	287,500	287,500
Max. Usable T.O. Weight	250,000	265,000	287,500	287,500
Design Landing Weight	189,000	189,000	190,500	190,500
Manufacturer's Weight Empty	114,489	118,265	120,737	115,877
Operating Weight Empty	119,726	123,532	128,862	123,726
Design Zero Fuel Weight	161,200	165,000	167,550	163,750
Fuel Capacity	114,400	114,400	140,500	140,500
Fuel Capacity (gals.)	17,600	17,600	21,615	21,615
Capacity Payload (Space Limited) (lbs.)	34,280	34,280	35,930	35,930
Number of Passengers	122	122	132	132
Cargo (lbs.)	14,150	14,150	14,150	14,150
Range (statute miles)	3,550	4,030	4,470	4,810
Reserve Fuel (lbs.)	16,500	16,680	17,180	16,800
Cost per Plane Mile ($ per mile)	1.54	1.72	1.93	1,835
Cost per Seat Mile (cents)	1.26	1.41	1.46	1.39
Level Flight Speed Max. Cruise Thrust (MPH, T.A.S)				
(a) at 30,000 ft., at 220,000 lbs.	561	586	586	582
(b) at 30,000 ft., at 200,000 lbs.	568	...	...	...
CAA Field Length Req'd for T.O. at Max. T.O. Weight (ft.)	9,440	8,640	8,760	9,000
CAA Field Length Req'd for Ldg. at Max Ldg. weight (ft.)	6,680	6,630	6,690	6,690
Range with 6500 ft. T.O. Field Length (statute miles)	1,830	2,650	3,060	3,280
Tourist Version				
Capacity Payload, Space Limited (lbs.)	37,910	37,910	37,910	37,910
Number of Passengers	144	144	144	144
Cargo	14,150	14,150	14,150	14,150
Range (statute miles)	3,290	3,790	4,330	4,670
Cost per Seat Mile (cents)	1.07	1.19	1.34	1.27
Range with 6,500 ft. T.O. Field Length	1,770	2,495	2,960	3,190

• All range and performance data pertains to specific payload and weights indicated.
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to 6,720 statute miles on the intercontinental model.

Since all DC-8s have the same dimensions, the aerodynamic characteristics and location of major elements are identical. Of particular importance, Douglas says, is uniformity in the air conditioning, electrical, hydraulic and control systems.

• **The intercontinental DC-8** differs from the domestic version only in its added fuel capacity and the greater structural strength needed to carry the additional fuel. These differences embrace thicker skin and stronger material within the wing structure, aft portion of the fuselage and horizontal stabilizer. The landing gear also is heavier on the airplane with the higher gross weight.

Because of the overall weight increase—up from an originally planned 211,000 pounds gross for the domestic version and 255,000 pounds gross for the overwater model, Douglas has changed its original coaxial-quad landing gear to a dual tandem gear. In this, however, it introduces an innovation by castering the rear pair of each set of four-main gear wheels. The dual tandem arrangement imposes less bending strength on airport concrete and the swiveling of the rear trucks preserves maneuverability in congested ramp area.

Pentagon Sets New Rules for Movement Of Personnel by Commercial Carriers

Pentagon for the first time has adopted uniform policies to govern military services in transportation of personnel via commercial air carriers.

The new policies, spelled out in Defense Instructions 4500.24, 4500.25 and 4510.2, will take effect March 1. Assistant Defense Secretary (Supply & Logistics) T. P. Pike has ordered each service to submit, within 45 days, its individual rules and instructions implementing the new policies.

Defense Instruction 4500.24, which sets new standards of airline service for CAM movements, also for the first time emphasizes use of pressurized aircraft in domestic operations. It states that, all other factors being equal, military departments will give preference to pressurized equipment when offered by carriers.

DOD Instruction 4500.25 sets policy on the use of land, air and sea transport and clarifies the status of newly authorized Supplemental Carriers in domestic and internation CAM operations.

It further specifies that services provided by Supplementals are considered coach type operations and do not constitute first-class accommodations.

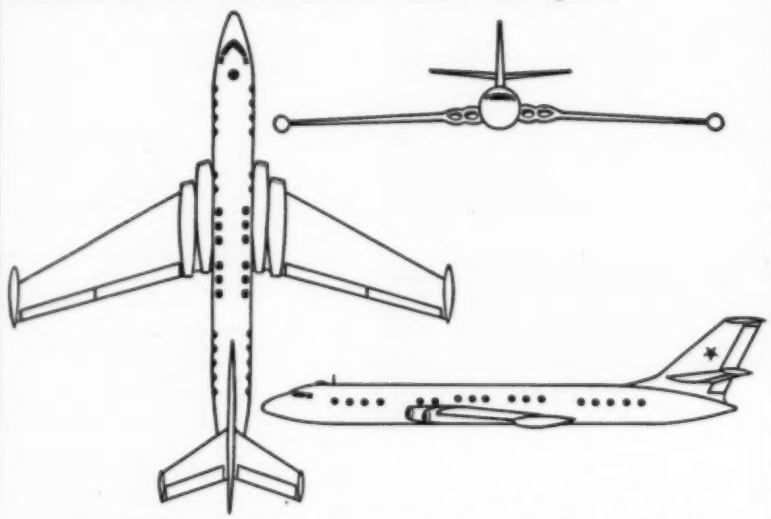
Supplementals are authorized to handle all complements of military travel from individuals to full plane loads by meeting certain provisions as to schedule reliability, accommodations and standards of service. They also qualify for international movements by meeting new cabin service standards spelled out in Instruction 4500.24.

A third new policy (Instruction 4510.2) sets maximum loads for commercial aircraft carrying military passengers. It is designed to prevent overloading, "hedge-hopping" flights with numerous fuel stops, and over-bidding by carriers on aircraft capacity.

New Pentagon load limits are based on a 66-pound baggage allowance and an average 160-pound passenger. Specific crew, passenger and weight limits are as follows:

Aircraft	Crew	No. of Passengers	Weight of Passengers & Baggage
DC-3 or C-47	3	22	5,000 (lbs.)
C-46	3	40	9,000 (lbs.)
Convair 240	3	36	8,100 (lbs.)
Convair 340	3	40	9,000 (lbs.)
DC-4 or C-54	4	67	15,000 (lbs.)
DC-6	5	80	18,000 (lbs.)
Constellation	5	84	19,000 (lbs.)
DC-7	5	60	14,000 (lbs.)

Russia's First Commercial Jet Transport



This jet transport is to be introduced by Aeroflot on its Moscow-Peking transcontinental route. Bearing a strong resemblance to the Bison bomber, the aircraft has a top speed of 560 mph and a service ceiling of 40,000 ft. Late last year General Zakharov, Russia's deputy civil aviation chief, said two new types of jet transport would be put into service early in 1956—a 50-passenger twin-jet model and 70-passenger four-engine aircraft. More recently, Marshal Zhavoronkov, Director General of Civil Aviation in the Soviet Union, indicated that Russian jet transports would be flying from Moscow to Paris this year. He confirmed that jet aircraft are currently in operation on several of Aeroflot's domestic routes.

CAA Lists 319 Projects On Airport Aid Program

Civil Aeronautics Administration recently released the fiscal 1956 airport aid program, the first under the $231,500,000 four-year authorization law. A total of 319 new projects have received tentative allocations of $38,932,065 out of the available $42,500,000.

The unprogrammed balance will remain available to the respective states for a two-year period, also provided for in the Monroney Act.

The new program is in addition to the 205 projects announced last summer under the $20-million appropriation provided in the CAA budget before enactment of the legislation.

Breakdown on the 1956 portion is: $30 million for state apportionment, $10 million for the discretionary fund and $2½ million for territories. Sixty-three million dollars has been authorized for the next three fiscal years. Fiscal 1957 authorizations, to be based on applications now on file, will be announced at a later date.

New missile marches with the infantry

Modern foot soldiers do more riding than walking. Trucks, tanks and parachutes give the infantry high-speed mobility that calls for equally mobile support weapons.

One such weapon is Honest John. Developed by Douglas in co-operation with Army Ordnance, this new missile is a free-flight rocket without complicated guidance system. It moves quickly into position on a special truck that serves both as transport and launcher. Highly accurate, Honest John can handle either a nuclear warhead or a single explosive round of enormous power.

The U.S. Army's Douglas-Designed HONEST JOHN Artillery Rocket

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APRIL 23, 1956

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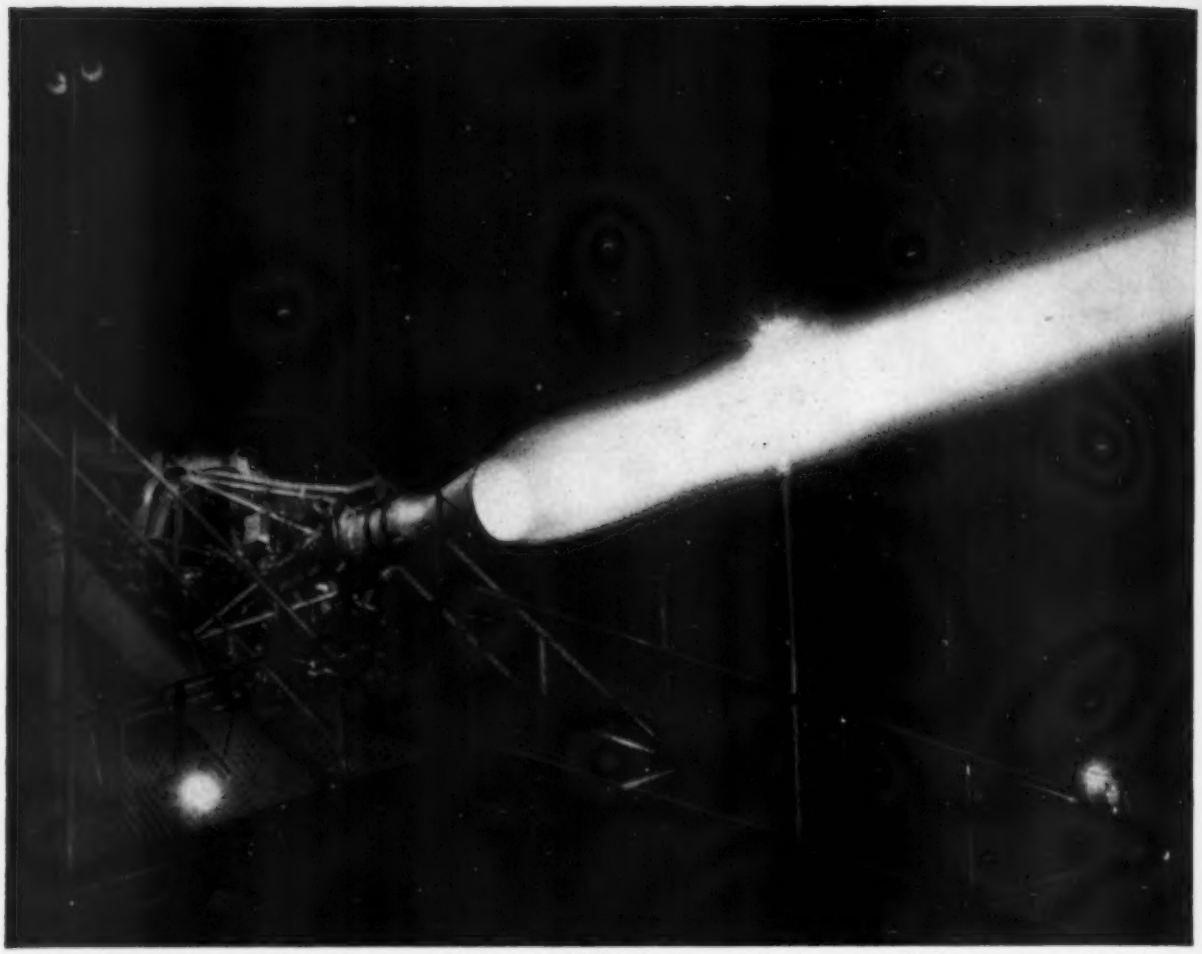

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BUILDERS OF POWER FOR OUTER SPACE

Airline Commentary

By Eric Bramley

On the sales promotion front, we congratulate three car rental companies —Avis, National Car Rental and Hertz —on their publication of a joint folder, principally for use in airline seat pockets. Car rental is an extremely competitive business and until now the three companies had individual folders. In our opinion, these served to clutter up the seat packs. Now 6,000,000 joint folders are being printed by the rental outfits for the airlines. Front cover is individualized (example: "Fly Mohawk, then rent a car"). Position of the three companies' names is rotated, so that no one gets permanent top billing. A major achievement.

• •

Evidently some of the airlines are check-calling each other to death. All carriers make periodic calls to check competitors' telephone answering time, sales technique, etc., but things can go too far. One major airline complains that it's receiving 25 to 40 such calls daily. It wants industry agreement on a top limit.

• •

Delta Air Lines' St. Louis reservations office handled a customer who should certainly qualify as "most considerate of the year." He phoned reservations, saying: "I just broke my leg and am lying on the floor waiting for an ambulance but thought I'd better cancel that space so someone else can use it!"

• •

Odds and ends: American Airlines, always in the forefront in applying electronics to reservations, will try a revolutionary system at Buffalo. Telephone sales agent will write reservations data on a special card, which will then be key-punched. Card will be inserted in electronic computer, which determines what messages are required, where they are to be sent, and then punches teletype tape which automatically feeds into the teletype system. More on this later . . . Airlines' no-show problem still getting worse. January showed another jump in percentage of no-shows to boardings . . . Ticket scandal in New York—airline employes accused of holding out Florida seats and selling them at last minute for a premium—could have contributed to the problem. Seats they couldn't sell for extra bucks would be reported as no-shows . . . CAA notes that DC-3 is still most commonly used airliner in U.S. domestic operations, with 299 of this model out of total of 1,398 in entire fleet . . .

Sales, Traffic, Promotion

Military Bureau of Air Traffic Conference has started a bang-up advertising campaign to sell scheduled airline service to military transportation officers and to soldiers traveling on leave. It's using five-minute radio programs plus ads in service publications. Also using ad with comic strip format in camp newspapers with total circulation of over 300,000...

"Geared for Growth" is new film strip, with synchronized sound, prepared by **Air Transport Association's** public relations department. Does an A-1 job of explaining scheduled airlines' contributions to commerce, postal service and national defense, plus economic growth. It's the first industrywide working tool to be furnished to sales managers, pubrel men, etc., to tell airlines' story to clubs and other groups...

Braniff Airways has adopted a "silver service" theme for its new Texas-New York flights. Motif is carried out in printed menus, sterling silver olive picks from Peru (souvenir for every passenger), eight-piece silver coffee service. Company is stressing food service...

To help establish its identity in recently-awarded northern cities, a "This is Delta" booklet has been printed by **Delta Air Lines.** Covers company history, cities served, equipment, and has double-page route map...Delta and **Southern Airways** have started a 23-week joint newspaper and radio campaign to further interline business...

TWA has big tie-in promotion with Anson Inc., manufacturer of men's jewelry. Anson has designed a new line of "ports of call" jewelry, inspired by international points served by TWA. Airline will be featured in 5,000 animated display pieces plus 5,000 lesser displays...

Pan American World Airways is installing Teleregister Corp.'s automatic reservations system in New York area. Central information rack will be located in Long Island City office and connected with eight sales offices in Manhattan, Bronx and Brooklyn. Availability will be stored on 50 flights for six months in advance, 50 for four months and 100 for two months...

Artist Norman Rockwell is doing illustrations for upcoming series of **PAA** ads. First will appear in March. PAA's U.S. sales organization set 1956 sales quota at $145,885,000 against last year's $123,886,000, a 17.8% jump. Sales program includes increased emphasis on incentive and group selling, on tours and convention promotions, and on pay-later plan. Personalized industry solicitation is to replace "blitz" methods...

Step toward better passenger service has been taken by **Mohawk** and **Allegheny,** with installation of a completely automatic telephone system covering their joint operation at West Side Airlines Terminal, New York. It's the 6A order turret system designed by **Western Electric,** and the carriers claim this is the first use of the unit in the airline industry. System can handle 4,000 calls in a working day, a 35% improvement, and is expandable to 8,000 with present space limitations, Incoming calls are automatically routed to reservations agents in less than one second after dialing has been completed. If all agents are busy, the call is answered in 18 seconds by an automatic recording device and is stored on a first-come-first served basis...

Congratulations to **National Airlines'** Washington office for a clever series of direct-mail pieces, each of which plugs a specific flight serving the city... Trans-Texas Airways now displaying a series of six new color posters at all stations...

Sally Ann Simpson, **Scandinavian Airlines System's** new travel and fashion authority, has written a booklet, "Shopping Your Way Through Scandinavia." Designed to help U.S. women shop when they go abroad, booklet contains maps of shopping districts, lists of best buys, names and addresses of stores, currency exchange rates, etc. Sally Ann (Mrs. Jean Gammon in private life) will do other booklets on the 43 countries served by SAS...

British Overseas Airways, advertising in U.S., Canada and Bahamas will be handled by Pemberton, Freeman, Bennett and Milne Ltd., of Toronto, in association with Victor A. Bennett Co., new York, effective Apr. 1. Foote, Cone and Belding Ltd. will continue to handle BOAC advertising for the rest of the world from its London office...

American Airlines passenger service note: company is serving 87,000 breakfasts and 220,000 lunches and dinners monthly. It's using 1,485,000 cups of coffee a month, 7,138 gallons of cream and 5,750 gallons of milk...AA has opened a ticket office in lobby of Statler Hilton Hotel, Dallas...

Quick-reference guide listing route patterns and document requirements for cargo shipments between U.S. and South America is being distributed by **Panagra...** "Top-Flight Hotels in Latin America" is title of colorful new booklet issued by Intercontinental Hotels Corp., PAA affiliate...

An important experiment in oral baggage declaration is being conducted at Miami International Airport. **U.S. Customs Service** has been allowing returning U.S. residents on designated Pan American flights to make oral declarations if they meet certain qualifications. A resident is eligible if his purchases abroad do not exceed $100, he has not more than one gallon of alcoholic beverages or more than 100 cigars, he has been out of the country at least 48 hours, has not claimed a customs duty exemption in the past 30 days, and has no unaccompanied articles to follow. About 75% of returning residents are said to meet these requirements. At the end of the six-week experiment in March, Customs will decide whether to put the procedure into effect permanently and whether to extend it to other gateways.

THE BULLETIN BOARD

Undisplayed Advertising: $1.50 per line, minimum charge $4.50. Cash with order. Estimate 30 capital letters and spaces per line; 40 small lower-case letters and spaces per line. Add two lines if Box Number is included in lieu of advertiser's name and address. **Displayed Advertising:** $18.00 per column inch. Space units up to full pages accepted in this section for classified-type advertising. Forms close three weeks preceding date of issue. Address all correspondence to Classified Advertising Department American Aviation Publications, 1025 Vermont Ave., N. W., Washington 5, D. C.

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AVIATION JOBS—Names and addresses of companies to contact, $2.00. Fitzgerald. (Chicago Division), Dept. A-30, 815 Countryside Drive, Wheaton, Illinois.

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ADVERTISER'S INDEX

U. S., India Agree On TWA, PAA Flights

U.S. and India have signed an air agreement under which TWA and Pan American will each continue to operate two round-trips weekly between the countries.

An accompanying exchange of notes provides that any proposed frequency increases must be filed with India 90 days in advance. If India has doubts about the increase, government consultations will be held before that nation denies or grants the request. Observers interpret this as considerably more restrictive than other bilaterals in that it is a step toward predetermination of capacity.

Agreement grants U.S. airlines one route from U.S. to Delhi/Calcutta and beyond to Ceylon, Burma, Thailand and beyond to U.S. and another to Bombay/Calcutta and beyond via same points to U.S. India receives approximately reciprocal routes to U.S. which are not expected to be operated in the near future.

CAB Rejects Nonsked's Bid for Overseas Route

North American Airlines' application for an exemption to start a transatlantic scheduled coach service on April 1 was turned down by the Civil Aeronautics Board this month.

Board ruled, in effect, that the issues were too complex to be decided on a non-hearing exemption basis and that North American must await action by the Board and the President on the non-scheduled group's certificate application.

The agency also expressed doubt over North American's qualifications, citing an action, now before the courts on appeal, which would revoke the group's operating authority for "willful and flagrant violations" of the Act.

No General Fare Probe Planned, Say CAB Officials

Officials of domestic trunk and local service airlines were told earlier this month by Civil Aeronautics Board staff officials that current CAB fare inquiries are not aimed at a general passenger fare investigation.

A meeting on February 13, called by CAB, was described by Board people as being for educational purposes only. Each carrier present was asked to produce the historical basis on which its fares have been constructed over the years. Also, descriptions were asked of practices used in computing charges when new routes are activated. No further meetings were contemplated.

Swissair Buys Two DC-8s

Swissair has ordered two Douglas DC-8s for delivery in the spring and summer of 1960, and has taken an option on a third aircraft. The two aircraft, modifications to bring them up to the airline's standards, and spare engines will cost a total of $16,300,000.

Obituaries

Air Vice-Marshal A. C. H. Sharp, 51, export sales director for The Glenn L. Martin Co., died Feb. 7 in Baltimore after a heart attack. He joined Martin after retiring from the RAF in 1953.

Victor Taiple, 48, aircraft factory specialist for CAA in Washington, died unexpectedly Feb. 12. He entered aviation in 1925 with Stout Airplane Div., Ford Motor Co., and worked for a number of Michigan aviation firms before joining CAA in 1947.

Marshal of the RAF Viscount Trenchard, 83, "father" of the Royal Air Force, died in London Feb. 10. Serving as Chief of Air Staff 1918-29, he had the job of putting the new RAF on as firm a basis as the two older services.

CAB NEWS

Pending Cases

The **East-West Air Freight Case,** based on certificate renewal applications of Slick and Flying Tigers, was voted on by CAB on Feb. 13, but public decision must await the writing and adoption of a formal opinion. There appeared little doubt that both lines would be renewed. But there was a spirited contest among the four CAB Members on the question of whether all-cargo carriers should have certificate authority to carry mail.

CAB is expected to rule that issues in the **Reopened Transpacific Case** embrace service between the four West Coast cities (Los Angeles, San Francisco, Portland and Seattle) and Tokyo via the Great Circle route. Pan American and Northwest are contestants. Despite expeditious handling, final decision in 1956 is not anticipated.

A case to watch for potential fireworks is that involving the issue of Pan American's "acquisition" of the Costa Rican line LACSA. Costa Rican government has protested to U.S. over possibility that CAB may force PAA to give up its one-third interest in LACSA. CAB will hear oral arguments March 7.

Examiner Thomas L. Wrenn's report in the New York-Florida Case is expected momentarily. At stake is the issue of a possible "third carrier" in the New York-Miami market.

Recent CAB Decisions

Seaboard & Western Airlines' previous operating authority continued until May 13, pending formal approval by foreign governments of services planned under S&W's transatlantic cargo certificate.

Slick Airways' charter of one Douglas DC-6A aircraft for use by **Riddle Airlines** over latter's newly-certificated domestic cargo routes, approved. Riddle will pay Slick $1.95 per mile with charter running through February 29, subject to possible additional extension.

CAB Calendar

Feb. 29—Oral argument, **Delta Air Lines Rate Case**—Offset Phase. Wash., D. C. Docket 2564.

Mar. 1—Prehearing conference, **Service to Puerto Rico Case.** Wash., D. C. Docket 7375 et al.

Mar. 2—Hearing, **Aerovias Brasil Foreign Permit Case.** Wash., D. C. Docket 7478.

EN ROUTE . . .

WAYNE W. PARRISH

More About Life in Leningrad

As I told you last issue, the Leningrad subway is an extraordinary sight. It's not only plush but it's clean and first-class. And this is one of the first observations any visitor to the Soviet Union makes within the first day or two—the study in contrast. Some things are well done but right alongside is ample evidence of the low level of the consumer economy.

I found the Leningrad subway riders intensely interesting. The trains were full but I also had to remember that there were many sightseers like myself because the line had opened only a few weeks earlier. Like subway riders everywhere, however, those wanting to get on the train tried to push their way into the cars before the disembarking passengers had a chance to get out. Another typical sight was the blank stares which all subway riders seem to have everywhere in the world.

But what an opportunity to study Russians! I am sure I was the only westerner anywhere around. So far as I could learn, I was the only one at that time in a city of four million. People paid no attention to me, aside from an occasional glance, although my clothing set me apart as a foreigner. What struck me about Russian clothing was its general warmth even though quality and design was usually poor. Clothing was certainly adequate for its winter purpose but much of it had a rather shabby appearance. But occasionally I spotted a woman with a good caracul coat and some of the men had fancy fur or caracul hats and a few had good overcoats or fur coats.

Uniforms and Uniforms

There seemed to be a surprisingly high ratio of men in uniform in Leningrad. Everywhere I went I saw them and they were invariably smartly dressed. Of course in the U.S.S.R. a uniform doesn't necessarily mean military because everybody has to have a uniform if he amounts to something. The number of men in non-productive bureaucratic jobs is quite high; it seems to be a sign of power if you hold down a functionary job of some sort, complete with fancy uniform.

Frankly, I liked the looks of the people on the streets and in the subway. They were just plain people. They looked like they had little gaiety, they all were serious and all were going somewhere. But underneath it all I suspect that most of them were pretty good human sorts who have had awfully little of life's good things and who have had to work, struggle and fight hard for survival. Many of them were dressed as I had imagined peasants would be dressed. Most of the subway riders, for example, seemed quite out of place in a marble-lined, bright-lighted place. But I was only an observer of the scene; there were the language and other barriers beyond which I, as a foreigner, couldn't penetrate. I wish I could have fathomed the thoughts of the thousands of Leningraders whose faces I peered into.

By the end of my first day in the U.S.S.R. I made a note that I had not seen anywhere near the number of photos and other likenesses of Lenin and Stalin I had anticipated. I had expected to be confronted with them everywhere. They were in the subway and the hotel, to be sure, but they weren't as prominent as I had expected.

Back at the hotel I asked the Intourist office if there was a ballet I could attend that night. There was. It was Romeo and Juliet. When the woman asked how many tickets I wanted I was somewhat taken aback. I wondered who in the world she thought I was going to take with me. In short order she got one seat, at about $7.00.

Then I had another lonely meal in that cold dining room. Cream of chicken soup, lots of it but not overly exciting. Two small tough beefsteaks with onions and potatoes, too greasy and rather tasteless. For dessert I had preserved fruit in a too-sweet syrup. The fruit was poor.

So then came the big adventure of going on my own to a Russian theater. Believe me, it's an experience the first time. The initial problem was how to find the theater. There are no city maps to be had anywhere in Russia. The Intourist woman said it was within ten minutes walking distance so I said, "Okay, which way do I go?" She gave me the directions and then I said, "How do I recognize the theater?"—since I can't make heads or tails out of a Russian sign and couldn't even pronounce the name of the theater. She said I couldn't miss it. So in the bitter cold I started out in the snow—it just kept on snowing continuously—to find the theater. I walked alongside a canal and across a bridge and in a few blocks I came to a big place which could be nothing else but a theater. There were cars arriving with the elite and lots of other people getting off buses and trams.

I joined a crowd going in one of the main entrances and along with everybody else shook the snow off my hat and coat. I was in a large lobby and beyond that were various passageways. I took a stab and went to the woman ticket collector at one entrance and held up my ticket. She said something which I couldn't understand but indicated to me to pass through. Having passed the first hurdle, which took me into the cloakroom area, I then made a second stab and held out my ticket to a woman at the next passageway.

She said something which indicated I wasn't doing too well. In the English which I always use no matter where I am, I said I couldn't understand and tried to get through the language barrier by sign language. No go. Finally a smartly-dressed young officer gave me a once-over and said "garderobe" in such a way as to indicate that I must be a very stupid goat and where did I think I was. So it dawned on me that I couldn't go to my seat without going to the garderobe, which is French for cloakroom. In the U.S. a checkroom is a nuisance and most people keep hats and coats with them in the seats. I discovered that in Russia nobody—repeat, nobody—goes into a theater or museum or anywhere like that without checking coats.

It suddenly occurred to me that I hadn't yet changed any money. I hadn't a thing except dollar bills and travelers' checks, so here I had to check my stuff. No choice. So I joined a long line at the checkroom and believe me, it's quite an operation. Coats, boots, packages and whatnot. I got a metal number when my turn came up and then tried the entrance again. This time the woman passed me through and I tried to indicate to her how was I to find my seat. There was a lot of Russian talk but no results.

Must Find Own Seat

I walked into the brilliant gilded opera house with five horseshoe tiers and found nobody to direct me to my seat, so I watched others and came to the dramatic conclusion that in Russia you find your own seat. Even though the language is impossible, I was at least grateful that the Russian numerical system is the same as ours. I found the rows and seats easily marked and soon I was in my seat. The opera house was more than half-filled by this time and I breathed a sigh of relief that I had made it this far.

Overhead was a huge and beautiful chandelier. I looked over the people and I gathered that going to the ballet is a big event. The women had on their best duds and seemed to pay a lot of attention, somewhat self-consciously, to their hair. The dresses were pretty old-fashioned. Men's suits, as always, were poorly tailored. But there was quite a sprinkling of uniforms. I didn't have a program but I picked one up later and couldn't make out a single word.

My seat was about the fifth row, excellent location. Shortly the orchestra assembled and it must have had between 80 and 100 pieces. All the seats became filled, the orchestra tuned up, the lights dimmed, the overture began, the huge outer curtain was pulled up, the stage lights went on, the inner curtain was drawn, and the Romeo and Juliet ballet began. It was a tremendous production, beautifully staged. It was, in short, magnificent.

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REFLECTIVE MARKINGS. Wald Industries, Inc. has issued a catalog (W-56) that gives full information about its Model 7105 "Truck-O-Liner," specially designed equipment for applying reflective paint to airport runways and similar large areas.
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STRUCTURAL PLASTICS. A 4-color, 20-page booklet published by Luria-Cournand, Inc. describes its wide range of structural plastic products, including aircraft enclosures, radar housing, etc.
Circle No. 102 on Reader Service Card.

RIVETS AND TOOLS. The Cherry Rivet Division of Townsend Co. offers a wall chart for quick reference purposes in aircraft industry tool cribs and stockrooms and in engineering and purchasing departments.
Circle No. 103 on Reader Service Card.

METAL LAMINATES. A handsomely printed brochure, containing samples of Col-O-Vin metal laminates, their applications and characteristics, has been issued by the Columbus Coated Fabrics Corp.
Circle No. 104 on Reader Service Card.

PIP PUSH INSERTS. The Heli-Coil Corp. offers a 4-page bulletin (No. 731) that describes and illustrates the PIP push insert, a screw-thread insert for use in molded plastics, laminates, alloys, powdered and light metals.
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ENGINEERING & MANUFACTURING FACILITIES. Westinghouse Electric Corp. has issued a 31-page booklet describing engineering and manufacturing facilities available at its Sunnyvale, Cal. plant. Products made at this plant are also described.
Circle No. 106 on Reader Service Card.

METAL BONDING ADHESIVE. Technical literature and directions how to use Resiweld, a new structural metal bonding adhesive, are available from the H. B. Fuller Co.
Circle No. 107 on Reader Service Card.

TANK FILLER CAP. Gabb Special Products Division of the E. Horton & Son Co. offers a data sheet on its tank filler cap for fuel, oil, alcohol-water and hydraulic reservoirs.
Circle No. 108 on Reader Service Card.

METERING VALVES. A 4-page bulletin giving technical data on Robbins metering valves for gases and liquids is available from Robbins and Associates.
Circle No. 109 on Reader Service Card.

ANTENNAS. A 100-page catalog issued by Andrew Corp. contains product description and engineering data on 500 of its products for radio transmission and propagation.
Circle No. 118 on Reader Service Card.

FUEL FLOW METER. Airwork Corp. offers an illustrated brochure on the new Bendix low-range fuel flow meter, designed for light twin-engined aircraft.
Circle No. 119 on Reader Service Card.

ALUMINUM PRODUCTS. A 24-page booklet issued by Kaiser Aluminum & Chemical Sales, Inc. contains up-to-date information on Kaiser aluminum alloys, forms, mechanical and physical properties, applications, fabricating and finishing techniques, and availability.
Circle No. 120 on Reader Service Card.

ADHESIVES, COATINGS & SEALERS. Minnesota Mining & Mfg. Co., Adhesives & Coatings Division, offers a 12-page booklet describing its wide variety of adhesives, coatings and sealers, many of which have aircraft applications.
Circle No. 115 on Reader Service Card.

ULTRASONIC INSPECTION. Sperry Products, Inc. has issued an 8-page booklet on ultrasonic inspection with its Reflectoscope, an instrument for the non-destructive detection and location of defects in materials.
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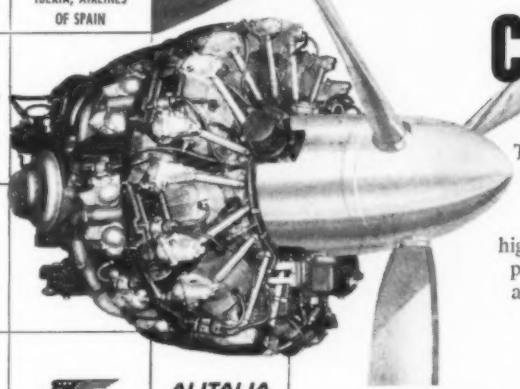

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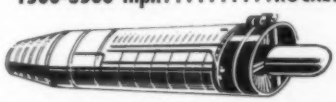
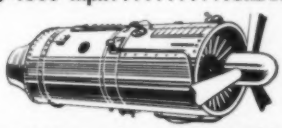


800-1500 mph.....TURBOJET



500-800 mph....TURBOPROP

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MILESTONES IN AVIAT

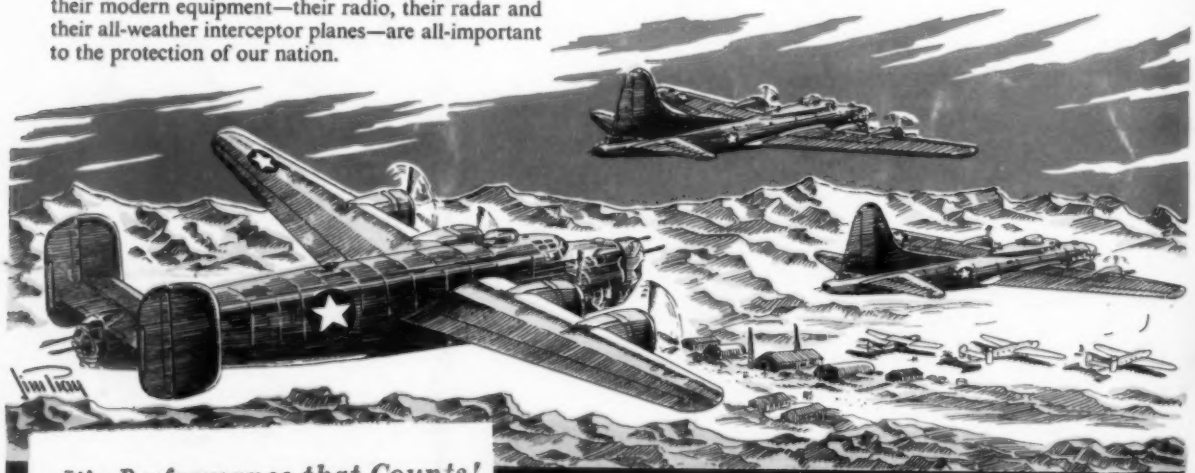
Arctic Outpost

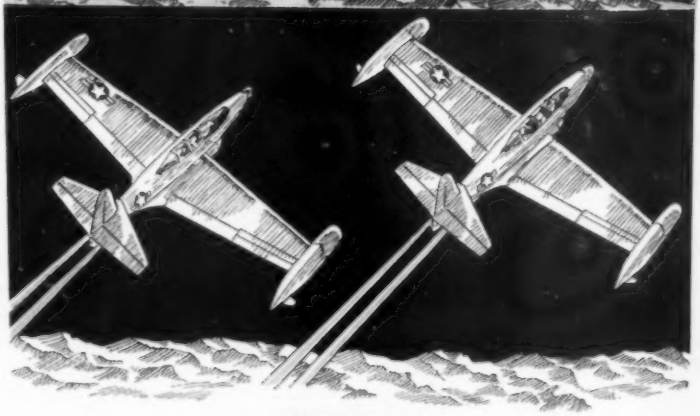
In 1941, the U. S. Army and Air Force decided to establish weather and radio stations, and airfields, on Greenland—to protect the exposed northeast section of the American continent. Lying directly on the air route to the British Isles and Western Europe, the huge ice-capped island of Greenland was an ideally strategic location for repair and refueling stations.

After Pearl Harbor, when clouds of American warplanes began to streak across the icecap, Army and Air Force foresight began to pay off. Airfields, repair and refueling stations, weather and radio stations were all in readiness for the vast air traffic which was to play such a vital part in winning the war.

Today these World War II Arctic Outposts, with their modern equipment—their radio, their radar and their all-weather interceptor planes—are all-important to the protection of our nation.

In 1926, Admiral Byrd (then Lieutenant Commander) and Roald Amundsen were rivals in the race to be first to fly over the North Pole. Byrd made his flight on May 9, 1926, in the tri-motor Fokker *Josephine Ford*. Amundsen followed two days later in the semi-rigid airship *Norge*.





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In the field of petroleum research for the development of more powerful, more efficient aviation fuels, Phillips Petroleum Company has long been noted for outstanding performance.

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Phillips produces tremendous quantities of 115/145 grade aviation gasoline for military and commercial use. And today Phillips also is making improved fuels for the latest designs in turbo-props and jets.

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AVIATION PRODUCTS

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